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ABSTRACT

The fourth in a series of annual reports assessing the role of and need for federal training programs in the biomedical and behavioral sciences is presented. Highlights of this 1978 report include: (1) the results of surveys of the chairpersons of 1,324 basic biomedical science departments and 474 behavioral science departments in Ph.D.-granting institutions; (2) some changes in the model that has been used to project future demand for doctorate-level faculty in the basic biomedical, clinical, and behavioral areas; (3) discussion of the special circumstances of the D.D.S. and D.V.M. holders in relation to supply and demand for training in the clinical sciences area; (4) an analysis of the work activities of nonclinical behavioral scientists in academic and in nonacademic settings; (5) the identification of a limited number of specific fields within the basic biomedical, behavioral, and clinical areas that warrant special attention; and (6) the results of on-site interviews with deans and faculty of schools of nursing that either have or expect soon to begin doctoral-level research training programs. Chapter One provides a statement of the objectives of the 1978 report and a synopsis of previous reports, and sets forth recommendations for federal support in each area of research training for fiscal year 1980-82. Chapters Two through Six focus on the pertinent issues and recommendations for the basic biomedical sciences, behavioral sciences, clinical sciences, health services research, and nursing research. A glossary and a large bibliography are included. (BH)

ED172661

PERSONNEL NEEDS AND TRAINING FOR BIOMEDICAL AND BEHAVIORAL RESEARCH

THE 1978 REPORT

of the

COMMITTEE ON A STUDY OF NATIONAL NEEDS
FOR BIOMEDICAL AND BEHAVIORAL RESEARCH PERSONNEL

COMMISSION ON HUMAN RESOURCES

NATIONAL RESEARCH COUNCIL

U.S. DEPARTMENT OF HEALTH,
EDUCATION & WELFARE
NATIONAL INSTITUTE OF
EDUCATION

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National Academy of Sciences
Washington, D.C.
1978

HE 011 470

NOTICE: The project that is the subject of this report was approved by the Governing Board of the National Research Council, whose members are drawn from the Councils of the National Academy of Sciences, the National Academy of Engineering, and the Institute of Medicine. The members of the Committee responsible for the report were chosen for their special competences and with regard for appropriate balance.

This report has been reviewed by a group other than the authors according to procedures approved by a Report Review Committee consisting of members of the National Academy of Sciences, the National Academy of Engineering, and the Institute of Medicine.

The work on which this publication is based was performed pursuant to Contract No. NO1-OD-5-2109 with the National Institutes of Health of the Department of Health, Education, and Welfare. Support for this project came from Evaluation Set-Aside funds (Section 513 of the PHS Act), Evaluation Project No. NIH 75-1.

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OFFICE OF THE PRESIDENT
2101 CONSTITUTION AVENUE
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September 30, 1978

The Honorable Joseph Califano
Secretary of Health, Education, and Welfare
Washington, D.C. 20201

My dear Mr. Secretary:

It is a pleasure to present to the Department of Health, Education, and Welfare for transmittal to the Congress, the 1978 report of the Committee on a Study of National Needs for Biomedical and Behavioral Research Personnel. This is the fourth annual report in the continuing study undertaken by the National Research Council pursuant to Title I of the National Research Act of 1974 (PL 93-348). The work has been supported under Contract NO1 OD 5 2109 with the National Institutes of Health.

The Act states (Section 473(a)) that the purposes of the study are to: "(1) establish (A) the Nation's overall need for biomedical and behavioral research personnel, (B) the subject areas in which such personnel are needed and the number of such personnel needed in each such area, and (C) the kinds and extent of training which should be provided such personnel; (2) assess (A) current training programs available for the training of biomedical and behavioral research personnel which are conducted under this Act at or through institutes under the National Institutes of Health and the Alcohol, Drug Abuse, and Mental Health Administration, and (B) other current training programs available for the training of such personnel; (3) identify the kinds of research positions available to and held by individuals completing such programs; (4) determine, to the extent feasible, whether the programs referred to in clause (B) of paragraph (2) would be adequate to meet the needs established under paragraph (1) if the programs referred to in clause (A) of paragraph (2) were terminated; and (5) determine what modifications in the programs referred to in paragraph (2) are required to meet the needs established under paragraph (1)."

Since the submission of the 1977 report, the Committee has made substantial progress in responding to the goals of the Act. Through the conduct of recent surveys, it has significantly expanded the data on which estimates of labor market conditions and planning needs are based. In addition, the Committee has, as it was asked to do, addressed training needs in the areas of health services research and nursing research. In the year ahead, the Committee will seek further improvement in its ability to assist HEW and the Congress in meeting the Nation's training needs.

We hope the present report will be helpful and shall be glad to discuss it with you and your staff.

Sincerely yours,

PHandler

Philip Handler
President

Enclosure

PREFACE

This is the fourth annual report prepared by the Committee on a Study of National Needs for Biomedical and Behavioral Research Personnel. This continuing study was initiated in 1975 following the passage of Public Law 93-348, The National Research Service Award (NRSA) Act of 1974. The Health Research and Health Services Amendments of 1976 broadened the authority of the Act to include nursing research training (Appendix A).

In its reports the Committee has focused on its legislative charge to assess the role of and need for federal training programs in the biomedical and behavioral sciences. Over the years the Committee has sought to identify and analyze: 1) the evolution of federal support programs and the changing conditions underlying this support; 2) the nature of the dynamic system linking training and employment in health-related research; 3) the definition of areas and fields of training need; 4) the problem of involving women and minority scientists in health research; and 5) administrative problems of realizing training objectives.

To inform itself about these issues, the Committee has engaged in a variety of activities. It has: 1) conducted surveys of individual scientists and departments to gather primary source information about current training and employment conditions; 2) developed a statistical model for projecting employment demand; 3) made site visits to recipients of federal training grants and to professional societies; 4) reviewed data and discussed issues with personnel from federal agencies concerning administrative practice; 5) convened conferences and meetings to address training and employment problems in particular fields; 6) invited the research community and the public at large to express views and give evidence at public hearings; and 7) monitored other studies, both within and outside the National Research Council (NRC), relevant to the Committee's interests.

In its previous reports (1975, 1976, and 1977), the Committee discussed in some depth the various issues and factors related to predoctoral and postdoctoral research training in the basic biomedical, behavioral, and clinical sciences and the disciplines related to health services research. In the 1977 report, in addition to making specific recommendations about the number of fellowship and traineeship awards that the federal agencies should provide during FY 1979-81, the Committee made a number of recommendations about the administrative policies of the NRSA program. The reader is referred to "Synopsis of Previous Reports" (Chapter 1) and to its previous reports for that background information.

Subsequent to the distribution of each of its 1976 and 1977 reports, the Committee conducted well-publicized all-day public hearings on these issues. With this base of public knowledge and understanding, the Committee this year reports its specific recommendations for FY 1980 and its recommended target goals for FY 1981 and 1982. These target goals will be reevaluated in the Committee's next report.

Of specific interest in this year's report are: 1) the results of surveys of the chairpersons of 1,324 basic biomedical science departments and 474 behavioral science departments in Ph.D.-granting institutions; 2) some changes in the models that the Committee has used to project future demand for doctorate-level faculty in the basic biomedical, clinical, and behavioral areas; 3) discussion of the special circumstances of the D.D.S. and D.V.M. holders in relation to supply and demand for training in the clinical sciences area; 4) an analysis of the work activities of nonclinical behavioral scientists in academic and in nonacademic settings; 5) the identification of a limited number of specific fields within the basic biomedical, behavioral, and clinical areas that warrant special attention; 6) the results of on-site interviews with deans and faculty of schools of nursing that either have or expect soon to begin doctoral level research training programs. With regard to the recruitment, graduate research training, and employment of minority group members and women in the biomedical and behavioral sciences, the Committee notes that at both of its public hearings these subjects attracted considerable attention. Although special studies of these topics could not be carried out in time for this report, the Committee is planning a survey of issues in graduate training in conjunction with the NRC's Committee on the Education and Employment of Minority-Group Members in Science. Similarly, the Committee looks forward to a collaborative effort with the Council's Committee on the Education and Employment of Women in Science and Engineering. In each instance the Committee believes that its work will benefit from the special expertise brought to these issues by the collaborating groups. Of particular interest to the Committee, although not limited to women and minorities, is the issue of midcareer training. This topic is discussed in a separate section in Chapter 1.

The Committee's annual report for 1978 consists of one introductory, overview chapter and five chapters devoted to the various areas of research training.

Chapter 1 provides a statement of the objectives for this year's report, a synopsis of previous Committee reports, discusses the quality of the research training enterprise, recognizes the continuing issue of training needs of women and of midcareer training, sets forth one recommendation of a general nature, and gives the numerical recommendations of the Committee for federal support in each area of research training for fiscal years 1980-82. Addenda to this chapter also contain a summary of the Committee's 1978 public hearing and a description of this year's activities and other relevant studies.

Chapters 2 through 6 consider the pertinent issues and the Committee's recommendations for the basic biomedical sciences (Chapter 2), behavioral sciences (Chapter 3), clinical sciences

(Chapter 4), health services research (Chapter 5), and nursing research (Chapter 6).

Finally, the Committee notes that all of the issues discussed in last year's report relative to the policies and administration of the NRSA program have been addressed by the responsible agencies, by Congress, or, in some instances, by both. These issues were: 1) the 3-year limitation on awards and the criteria for waiver of limitation; 2) payback provisions and waiver of the payback requirement; 3) stipend levels as these are affected by taxation and the increasing cost of living; 4) multidisciplinary training grants; and 5) announcement fields. The first three points have been the focus of both executive agency and congressional scrutiny and action, the results of which are embodied in the pending renewal legislation. The latter two points have been explored in depth by representatives of the Committee and its advisory panels in discussions with senior officials of the Alcohol, Drug Abuse and Mental Health Administration (ADAMHA) and the National Institutes of Health (NIH), who now are reviewing these matters.

In view of these developments, the Committee has concluded not to reiterate this year its earlier recommendations involving these issues.

Of special interest to the Committee is the plan recently announced by the Secretary, Department of Health, Education, and Welfare (DHEW), for the Department to develop a new multiyear health research policy that, in addition to placing greater emphasis on basic research, will help to bring an important measure of stability to the research enterprise. The Committee has noted in each of its reports that the level of federal support for biomedical and behavioral research is the single largest determinant of the need for research personnel in these areas. The work of the Committee will be facilitated should such a national health research plan be developed and implemented.

As Congress continues both to extend the NRSA program in time and to broaden its coverage, continued cooperation between federal agencies and the Committee will provide Congress and the public at large assurance that both the conduct of the program and its oversight will proceed in a healthy and constructive fashion.

Henry W. Riecken, Ph.D.
Chairman

James B. Wyngaarden, M.D.
Vice Chairman

ACKNOWLEDGMENTS

In developing this report, the Committee has benefited from the support and advice provided by many people and organizations. In particular, the Committee acknowledges the contributions of the chairmen and members of its four panels who compiled information, interpreted findings and formulated recommendations for the Committee's consideration.

Several agencies interested in this study supplied information and assistance. Financial support was provided by the National Institutes of Health. Donald S. Fredrickson, Director of the National Institutes of Health, Robert A. Butler, Director of the National Institute on Aging, and Gerald L. Klerman, Administrator of the Alcohol, Drug Abuse and Mental Health Administration met with the Committee earlier this year and presented their views on the training programs. The Committee wishes to acknowledge its appreciation to the senior staffs of NIH and ADAMHA for several opportunities that have been provided to come together professionally to consider matters of policy, program administration, and other points of mutual interest and concern. William H. Batchelor served as project director for the National Institutes of Health and maintained excellent liaison with the Committee and its staff. The Committee is pleased to acknowledge the assistance of both Nicholas C. Moriarity, Jr., NIH, who provided data on NIH training programs, and officials of the Alcohol, Drug Abuse and Mental Health Administration, the Division of Nursing of the Health Resources Administration, and the National Center for Health Services Research who provided similar assistance.

The Committee has maintained a close and active interest in the work of the President's Commission on Mental Health, under the chairmanship of Thomas E. Bryant. Four members of the Committee and its panels have served on the Commission or one of its task panels. The Committee is particularly grateful to Beatrix Hamburg, Daniel X. Freedman, and B. Victor Pfeiffer for the time they devoted in keeping the Committee aware of the general progress of the Commission.

The Committee has also worked closely with the Institute of Medicine's Committee on Health Services Research, under the chairmanship of Robert Ebert. The staffs of these two studies have been in close communication and have kept the Committee aware of discussion and developments relevant to research training needs in this area.

The Committee is grateful for the contributions of Kathleen S. Dolan and Thomas E. Morgan, whose study of programs for the training of clinical investigators has been an important resource for this report.

The Committee would like to thank Mary Kelly Mullane of the American Association of Colleges of Nursing, and Constance Holleran of the American Nurses Association for their help in developing the present assessment of doctoral training needs in nursing research.

Within the Commission on Human Resources, Harrison Shull, Chairman of the Commission and William C. Kelly, its Executive Director, offered helpful counsel and assistance during all phases of the study. Valuable support was also provided by the staff of the Data Processing and Supporting Services Offices of the Commission.

The Committee's staff, under the direction of Herbert B. Pahl, supported the Committee and panels by conducting the surveys and other data collection activities, performing the analyses, and preparing reports of the findings. Allen M. Singer supervised the collection of data from the agencies and performed the analyses which led to the projections of academic demand in the basic biomedical, behavioral, and clinical sciences areas. Pamela Ebert-Flattau coordinated the data collection and analyses in the areas of behavioral sciences, health services research and nursing research. John C. Norvell and Samuel S. Herman served as executive secretaries to the Basic Biomedical and Clinical Sciences Panels and supervised staff support of those panels' activities respectively. Robert G. Snyder had primary responsibility for the conduct and analysis of the Survey of Biomedical and Behavioral Science Departments. Porter E. Coggeshall, who early in the year assumed responsibility for a new Commission study on postdoctorals and doctoral research staff, continued to provide assistance with analyses and interpretations of survey findings.

The Committee enjoyed superior administrative, technical and clerical support. Kay C. Harris ably handled administrative matters, while J. Richard Albert, Corazon M. Francisco, Rebecca C. Stuart, and Ingrid A. Wharton provided excellent research assistance. Imani R. Ansari, Marie A. Clark and Janie B. Marshall supplied outstanding secretarial support, often under considerable time constraint.

To all these persons and organizations, the Committee expresses its warmest thanks.

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ABBREVIATIONS

AAAS	American Association for the Advancement of Science
AAMC	Association of American Medical Colleges
ADAMHA	Alcohol, Drug Abuse, and Mental Health Administration
AMA	American Medical Association
APA	American Psychological Association
CHR	Commission on Human Resources (NRC)
CIC	Committee on Institutional Cooperation
CMHC	Community Mental Health Center
DHEW	Department of Health, Education, and Welfare
EPA	Environmental Protection Agency
F/S	Faculty/Student ratio
FY	Fiscal Year
HCFA	Health Care Financing Administration
HRA	Health Resources Administration
HSA	Health Systems Agency
HSR	Health Services Research
IOM	Institute of Medicine
JAMA	Journal of the American Medical Association
MSTP	Medical Scientist Training Program
NAS	National Academy of Sciences
NCHSR	National Center for Health Services Research (Office of the Assistant Secretary for Health, DHEW)
NEBHE	New England Board on Higher Education
NHLBI	National Heart Lung and Blood Institute (NIH)
NIA	National Institute on Aging (NIH)
NIAAA	National Institute on Alcoholism and Alcohol Abuse (ADAMHA)
NICHD	National Institute of Child Health and Human Development (NIH)
NIDA	National Institute on Drug Abuse (ADAMHA)
NIDR	National Institute of Dental Research (NIH)
NIEHS	National Institute of Environmental Health Sciences (NIH)
NIGMS	National Institute of General Medical Sciences (NIH)
NIH	National Institutes of Health
NIMH	National Institute of Mental Health (ADAMHA)
NLM	National Library of Medicine (NIH)
NRC	National Research Council
NRSA	National Research Service Award
NSF	National Science Foundation
OSTP	Office of Science and Technology Policy
PBB	Polybrominated Biphenyls
PHS	Public Health Service
R and D	Research and Development
SREB	Southern Regional Education Board
VA	Veterans Administration
WCHEN	Western Council for Higher Education for Nursing
WICHE	Western Interstate Commission on Higher Education

GLOSSARY

Area--One of the five broad areas of training designated by the Committee as being within the purview of this study: (1) basic biomedical sciences, (2) behavioral sciences, (3) clinical sciences, (4) health services research, and (5) nursing research (cf. Field). The fields comprising the basic biomedical, behavioral, and clinical sciences may be found in Appendix D3. See Chapter 5, Table 5.1, for a listing of fields in health services research. See Chapter 6, p. 1, for a definition of nursing research.

Award--In the present and previous Committee reports this term refers to the granting of a fellowship to an individual or, in the case of a training grant, to a training position made available on the grant. It is usual in the latter case f[illegible] single training grant to provide for several training positions.

Center--National Center for Health Services Research (NCHSR) of the Health Resources Administration (HRA).

Clinical Investigator--a medical scientist with a professional or academic doctorate who conducts research in the clinical sciences. Also, clinical scientist.

Clinicians in Mental Health Research-- scientists with either a professional doctorate or an academic doctorate in a human service field such as clinical psychology or counseling and guidance psychology, who conduct mental health research.

Committee--Committee on a Study of National Needs for Biomedical and Behavioral Research Personnel.

Committee Surveys:

Survey of Recent Doctorate Recipients--Survey of Biomedical and Behavioral Scientists conducted by the Committee and the National Research Council (NRC), 1976.

Department Survey--Survey of Biomedical and Behavioral Science Departments conducted by the Committee and the NRC, 1977.

Surveys of Doctoral and Pending Doctoral Programs for Nurses conducted by the Committee and the NRC, 1978.

Doctorate Recipients:

Academic--received Ph.D. or equivalent degree.

Professional--received M.D., D.D.S., D.V.M., or other health professional doctorate.

Field--the training or employment specialties within each of the broad areas (cf. Area).

Labor Force--includes persons employed in positions other than postdoctoral appointments, as well as unemployed persons who are seeking employment.

Medical Scientist Training Program (MSTP)--broad, institutionally based programs, sponsored by NIH, designed to assist universities and their medical schools in providing selected trainees with the essential scientific medical background needed for a career as a medical scientist, generally leading to a combined M.D./Ph.D. degree.

Minorities--those racial and ethnic groups included in the following categories: American Indian or Alaskan native; Asian or Pacific Islander; Black; and Hispanic.

National Institutes of Health (NIH); Alcohol, Drug Abuse, and Mental Health Administration (ADAMHA); Health Resources Administration (HRA)--federal agencies of the Public Health Service (PHS), Department of Health, Education, and Welfare (DHEW), that provide the primary sources of support for biomedical and behavioral research and research training. The largest agencies, NIH and ADAMHA, are organized into bureaus and institutes that pursue various health problems.

National Research Service Award Act (NRSA Act, PL 93-348, 1974)--the Act under which this study is undertaken. It charges the Committee with investigating the nation's training needs in the biomedical and behavioral sciences. For sections of the Act pertinent to this study, see Appendix A.

Panel--refers to any of four specifically cited disciplinary panels associated with this study--Basic Biomedical Sciences, Behavioral Sciences, Clinical Sciences, or Health Services Research.

Report--one of the annual reports issued by the Committee.

Training Levels:

Predoctoral--study in a graduate program by pre-Ph.D. students and by pre-M.D.'s who are engaged in full-time research training for a complete academic year. Beyond what is normally considered graduate education, predoctoral training, as used in this report, also includes clinical science training in the Medical Science Training Program, often leading to a combined M.D./Ph.D. degree.

Postdoctoral--specialized research training taking place after receipt of a Ph.D. or health profession degree.

Post-Ph.D.--specialized research training taking place after receipt of a Ph.D. degree.

Postprofessional--research training taking place after receipt of a medical, dental, veterinary, or other health professional doctorate.

Training Mechanisms:

Fellowship--awards made directly to the individual, largely in the form of a stipend, from a variety of sources, such as the federal government, voluntary health organizations, foundations, and universities; may include an institutional subvention; PHS fellowships are awarded to individuals at particular institutions.

Training Grant--awarded to nonprofit private or nonfederal public institutions through peer review competition, generally for five-year renewable periods; in addition to student support, includes institutional program support for maintenance of the training environment.

Research Assistantship--graduate student support obtained through a research grant or contract to a faculty member; research associateships are similar awards at the postdoctoral level.

Teaching Assistantship--graduate student support provided for teaching services; not specifically designed for research training.

Self/Private Support--graduate student support derived from personal resources, including work, loans, and spouse and/or family.

1. INTRODUCTION AND SUMMARY OF NUMERICAL RECOMMENDATIONS, FISCAL YEARS 1980-82

OBJECTIVES OF THE 1978 REPORT

The Committee's broad objectives for this year's report are to expand its analysis of the role of and need for federal training programs and, as a result, to reassess or modify and extend its recommendations of previous years. The continuing objectives of this report are to 1) make numerical recommendations for predoctoral and postdoctoral support for broad training areas and for the support mechanisms appropriate to these levels and areas of training and 2) identify, where possible, fields where training needs deserve special emphasis.

Beyond these continuing objectives, the Committee in this year's report attempts to extend its knowledge of the training process in several new directions. First, the Committee examines the impact that reductions in training grant support in the early 1970's have had on full-time enrollment levels and program activities in the basic biomedical and behavioral sciences (Chapters 2 and 3). Related to this discussion is the issue raised in the National Research Service Award (NRSA) Act of the adequacy of alternative support mechanisms to provide sufficient numbers and quality of personnel.

Second, the Committee begins to address training needs as they pertain to nonacademic settings. In the past, the Committee has concentrated its analysis of demand almost exclusively on the market in academia for trained personnel. This year, in response to comments made at the public hearing the Committee discusses the employment opportunities available in the nonacademic sector (Chapters 2, 3, and 5).

Third, the Committee begins an in-depth investigation into the needs for training in the clinical sciences. Studies have been commissioned to clarify the composition of the clinical research population and their special training needs. Limited attention is given to fields of veterinary and dental research training (Chapter 4). In the area of the behavioral sciences, the special situation of the clinical investigator in mental health research is explored (Chapter 3).

Fourth, further progress is made in defining the training needs in the emerging area of nursing research. The Committee reports extensive information gathered on the state of the development of doctoral programs in schools of nursing (Chapter 6).

Finally, the Committee again discusses the role of federal support in the provision of high-quality research training.

Prior to treating these issues, the Committee believes the following section, highlighting past Committee reports, will be helpful in providing a framework for this year's report.

SYNOPSIS OF PREVIOUS REPORTS

The first report of the Committee was issued in June 1975, only four months after the National Academy of Sciences had accepted the task proposed for it by Congress under the NRSA Act of 1974. Because of time constraints, the Committee devoted its initial report to a description of the organization of the study, an outline of the issues involved, and a presentation of the limited data available at that time. Each subsequent report has updated or enlarged the scope of previously addressed topics and has included some that are discussed for the first time.

In organizing this study, the Committee divided the biomedical and behavioral fields into four areas: 1) basic biomedical sciences, 2) behavioral sciences, 3) clinical sciences, and 4) health services research. A panel of experts was formed to assist the Committee in each area, and an additional panel was created to guide the data collection and analyses. It was recognized very early in this study that the legislative request to specify the nation's personnel needs in the fields of biomedical and behavioral research would be impeded by the difficult problems of definition and classification. An attempt was made in the first report to define each of the four broad areas in terms of the disciplinary fields included within them. These initial definitions have been revised in subsequent reports, but the problems of taxonomy and determining need at the disciplinary level continue to be among the most intractable ones facing the Committee. The major problem, as pointed out in the 1975 report, is that the boundaries between disciplines are difficult to draw. This problem is compounded by the adaptability of biomedical/behavioral scientists and their capacity for mobility within and across fields. This is especially true for transfers from more fundamental to more applied fields, and for transfers that are facilitated by postdoctoral training. Lastly, there is the difficulty of predicting major scientific developments and their potential impact on personnel requirements.

In view of these considerations, the Committee's recommendations have been directed almost exclusively to broad areas rather than the disciplinary subgroups, although, as noted below, some of the latter were given special consideration in the 1977 report.

The 1975 report provided definitions for the key concepts basic to this study--training grants, fellowships, insitutional support, predoctoral and postdoctoral training--and discussed

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their relationship with the quality of biomedical and behavioral research conducted in this country. A short history of the relevant federally supported programs was provided along with a summary of career outcomes of former trainees and fellows who participated in them.

The Committee's second report (1976) assessed the current academic labor market and near-term outlook for biomedical and behavioral scientists. In most of these fields, the Committee found that an ample supply of Ph.D.'s was available. In fact, because the rate of growth in biomedical and behavioral research and development (R and D) expenditures had slowed perceptibly since 1968, and because college enrollments were expected to stabilize by 1980 while Ph.D. production continued at a high level, the Committee concluded that a slower rate of growth in the labor force in these fields was advisable. Accordingly, the Committee recommended a modest reduction in the number of federally supported predoctoral students in the basic biomedical and behavioral areas.

Postdoctoral support, the Committee believed, should be held constant in the basic biomedical sciences and increased in other areas. In the behavioral sciences, the recommended shift to predominantly postdoctoral training represented a significant reorientation of federal support and graduate training patterns in this area. This recommendation was developed partly in response to the growing need for more specialized investigators capable of dealing with the increasingly complex research questions in the area of behavior and health. On the other hand, the clinical sciences area was seen as needing increased support to help stimulate the flow of M.D.'s into clinical research careers. These initial recommendations were intended to remain in effect until the Committee's impressions about the market could be confirmed or modified by further analyses and additional data.

In 1977, the Committee found evidence that newly trained biomedical and behavioral Ph.D.'s were encountering increasing difficulty in obtaining permanent faculty positions. The number of these Ph.D.'s on postdoctoral appointments (which the Committee considers to be temporary positions) had been rising at a rate of over 13 percent per year between 1972 and 1975 in the biomedical sciences. Furthermore, the Committee's 1977 Survey of Recent Doctorate Recipients showed that more than 40 percent of these postdoctoral appointees in biomedical fields had prolonged their appointments because they could not find suitable employment. These indications of a tight job market facing new Ph.D.'s in these fields prompted the Committee to recommend an additional 10 percent reduction from the number of predoctoral trainees in the biomedical sciences supported by the federal government in 1976. The postdoctoral recommendation was unchanged.

Certain fields within the basic biomedical sciences exhibited evidence of better-than-average employment prospects and were

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cited as exceptions to the recommendation for reduced predoctoral support. The fields of biostatistics/biomathematics and epidemiology showed no postdoctoral holding pattern and appeared to be attracting people from closely related fields, such as statistics, that are outside the biomedical sciences. For these fields, the Committee recommended no reduction in predoctoral support levels.

In its 1977 report, the Committee presented for the first time a systematic treatment of health services research training needs, providing a definition for this emerging research area and a preliminary list of training difficulties that face it. In addition to calling for a continued expansion of mental health services research training, primarily at the predoctoral level through the programs of Alcohol, Drug Abuse, and Mental Health Administration (ADAMHA), the Committee called for an extension of the NRSA authority to permit training in the general area of health services research especially through the programs once provided by the National Center for Health Services Research (NCHSR).

Nursing research training was officially brought under the purview of the study by amendments made to the NRSA Act in 1976. In its 1977 report, the Committee provided the results of its survey of nurses who had completed their doctoral training between 1971 and 1975. The findings suggested that opportunities for employment for doctorally trained nurses was favorable, and led the Committee to suggest an expansion of research training support, predominantly at the predoctoral level.

The Committee's 1977 report also discussed the issues of mid-career training and the participation of minorities and women in biomedical and behavioral research; the administrative problems of the 3-year limit on awards, the payback provision, announcement fields, and multidisciplinary awards; the education and training process by which most biomedical and behavioral scientists are produced; and the importance of federal support in sustaining the research training system.

Earlier reports of the Committee have been distributed to university libraries and graduate school deans. Limited copies are also available upon request to the Committee.

Within the context of these previous efforts, the Committee will now proceed to discuss the issues pertinent to this year's report.

TRAINING GRANTS AND THE QUALITY OF TRAINING

Most training grant programs were originally focused on the apparent need for increasing the number of well-trained research personnel. However, in developing a stable continuing policy for government support of training programs in the biomedical sciences, it is essential to consider other effects that may be less obvious than the contribution of mere numbers. Many experienced observers believe, for example, that training grants have been just as important in improving the quality of training as in providing for increased numbers. It must be admitted at once that it is not easy to provide absolutely convincing proof that a given sum of money has resulted in a specific increment of quality in research training. This difficulty of evaluation pervades the entire education process. Repeated attempts to identify the various factors which contribute to effective education at any level from first grade through graduate school have provided embarrassingly little evidence that any of the well-known factors that educators, parents, students, and taxpayers argue about so vehemently make much difference. Perhaps the major difficulty facing the evaluator is the very strong correlation between the ability of the students at entry and their ability at graduation. Thus, it has been shown that children with a good command of spoken language and who score high on "reading readiness tests" before entering first grade are found to be reading increasingly above grade level as they proceed through primary and secondary school. This effect is so large as to overwhelm the effects of such variables as teacher training, teacher/student ratio, the number of books in the library, and so on.

Similarly, graduate schools that have a reputation for turning out the best graduate students tend to attract the best entering students. They are also, generally speaking, the same schools to be judged most worthy of training grants by peer review bodies. One cannot therefore demonstrate the effect of training grants in improving graduate education simply by pointing to the quality of the emerging student or the high rating given to the training programs by surveys of qualified judges. This problem will be discussed later in an attempt to outline how certain rather special aspects of graduate education may be exploited by programs of evaluation designed to aid future policy making in the wise and efficient use of training funds.

In the meantime, and in the absence of precise facts or validated educational theory, serious attention must be paid to the overwhelming opinion of informed observers that the training grant programs have very importantly improved the quality of research training. In support of such opinion one may also cite certain specific uses of these grants, the significance of which appeals immediately to common sense.

First, one of the most important uses of training grant funds is to provide research equipment and supplies for use by the trainees. Research training is unlike many other forms of education in that it cannot be learned solely from books. Indeed it may be the example par excellence of "learning by doing," especially in the biological sciences, where almost all advances depend upon new observations in the laboratory rather than theoretical reasoning. It is simply a matter of fact that, when training grants were started, very few institutions in the country could afford to provide their graduate students or even their postdoctoral fellows with suitable scientific apparatus and supplies.

Research supplies include such items as expensive experimental animals and unusual chemicals, which put a heavy stress on any departmental budget. Much biomedical research depends also upon the availability of specialized apparatus, costing in the tens to hundreds of thousands of dollars. Unfortunately from the financial standpoint, but not from the point of view of the progress of science, such apparatus tends to become obsolete rather rapidly and must be frequently replaced if students are to receive training in the technologies of the future. Many of these instruments require special training for their use, and it is the custom in good training laboratories to assign a high level technician to protect the apparatus from misuse and train the graduate students and visiting investigators in its proper handling. Such personnel are often at least partially paid from training grants and certainly play an essential role in the training process.

Second, training grants have almost certainly improved the quality of training by providing a portion of the salaries for additional faculty members. One of the major purposes of training grants has been to encourage interdepartmental training programs. The field of genetics provides an excellent example. In many institutions the geneticists may be found in several different departments--plant geneticists in the botany department, animal geneticists in the zoology department, insect geneticists in the department of entymology, bacterial geneticists in the department of microbiology, and medical geneticists in the medical school--and in universities with an agricultural college, they may be found additionally in the departments of agronomy and plant breeding. In many institutions, training grants have served to bring such scattered teachers together to provide broad training to graduate students and postdoctoral fellows in important fields that transcend departmental boundaries. More often than not, however, some important disciplines may be missing, and training grant funds may be used to fill the gap on either a permanent or visiting basis. The need for such additions to faculty is particularly important in rapidly advancing fields. In several areas of biology, for example, the older faculty may not have received much training in mathematics, but current developments in population biology, for example, demand a good working knowledge of statistics. Similarly, the important area of ecology relies increasingly on mathematical modeling and on advanced methods of analyzing small amounts of air and water pollutants. Training grants play an essential role in rounding out the faculty to provide instruction in such rapidly developing areas.

Third, training grants contribute to excellence simply by providing an increased number of graduate students to a high-quality department. Many newer departments, staffed with excellent young teachers in some of the rapidly developing parts of the country, have not yet developed a reputation sufficient to attract a critical mass of graduate students. Training grants, by providing a reasonable number of traineeships, help these departments to overcome this deficiency in a much shorter time than would otherwise be the case. By careful adjustments of such support, a more equitable distribution of students may be effected without any net overall increase in numbers.

Fourth, there has been so much discussion, both among the public and in the Congress itself, about the importance of improving scientific communication, that perhaps one need only mention the importance of training grants in providing for the purchase of essential printed materials and forwarding the informal communication which is such an important part of the scientific process. Training grants have been widely used for paying the traveling expenses of visiting investigators, who may come for 3 or 4 days to present seminars on subjects of particular interest or to participate in laboratory work designed perhaps to resolve difficulties or contradictions that have arisen in the work of two different research groups. Modest use has also been made of training grant funds to help send graduate students to scientific meetings where they have a chance to present their own work and to meet the distinguished leaders in their field.

As a point of caution, however, it should be noted that the role of program support has been altered with the phasing out of the "old" training grant awards and the phasing in of the new NRSA awards beginning in 1975. The significance lies in the fact that the amount of training grant support devoted to improving the training environment is falling from the 50 percent level present in the late 1960's and early 1970's to an administratively mandated upper limit of 25 percent. While all areas of program support have been affected by this cutback, faculty support in particular has practically been eliminated.

In summary, although this Committee is well aware of the difficulties of proving the effects of any specific parts of the training process, it believes that training programs, especially at the National Institutes of Health (NIH) and ADAMHA, are important in upgrading the quality of departmental and especially interdepartmental training programs. Indeed, it regards the maintenance of such quality as a major reason for the maintenance of the training grants program, although the primary need is no longer for increased numbers (except for a few fields highlighted elsewhere in the report). If numbers of trainees are to be reduced, it would seem wise to retain quality by increasing the percentage of grant funds allowed to be used for upgrading and maintaining the quality of training, since otherwise the absolute amount of such funds is quite likely to fall dangerously short of the national need as numbers of students decline.

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Future Research

As suggested above, however, we remain dissatisfied with the lack of quantitative evidence for the effectiveness of deliberate modifications of the educational process and recognize that more carefully designed research must be undertaken in this area. Several unusual features of education at the graduate level suggest that it may be more amenable to the evaluation of specific factors than one might at first suppose. For example, the quality of the entering students, though variable, is much less so than at earlier levels of the educational process. For example, the range in I.Q. of students in graduate school is probably only about half that of students at lower levels. Thus the effects of native ability or of previous environment are less overwhelming, and correlations between input and output may be expected to be less. On the other hand, the schools themselves differ widely in the number of degrees conferred, students enrolled, student/teacher ratios, the availability of advanced instrumentation, experimental animals, library facilities, and so on.

It is also known that the research output of trained investigators varies equally widely. Some publish many papers. Others may publish relatively few papers, but of such a quality as to be everywhere recognized as of great importance. The most difficult problem is to determine the quality of output of the large number of biological scientists who publish at a more or less normal rate of one or two to five or six papers a year. Substantial efforts have been made to evaluate such outputs by finding out how often each paper is cited by other authors and to what purpose. These adjusted citation indices are being constantly refined and are beginning to be used, at least tentatively, as suggested measures of the significance or quality of scientific output of particular research units or individual investigators.

There are other ways in which excellence is recognized by the scientific community. In this category are Nobel prizes, other awards, and invitations to give distinguished lectures or to serve on boards of high quality journals or peer review groups. All these contribute to an assessment of the standing of particular scientists. In the more applied areas, some inferences can perhaps be drawn by the number of patents granted.

In summary the Committee believes that there may be ways of identifying and measuring several of the most important differences in graduate education at various institutions and there are nascent methods for measuring results in terms of the research output of the persons trained in such institutions. In the not too distant future, therefore, it may be possible to correlate training procedures with results and, by means of such analyses, aid the policymakers in the difficult task of deciding how much of the federal budget to invest in research training and where it is best to invest it.

The Committee will continue to search for methodologies appropriate to evaluating training program quality. It also notes that support of research to develop such methodologies would appear to be a proper function of government agencies such as NIH and the National Science Foundation (NSF) with their very large stakes in the effectiveness of research training.

TRAINING FOR WOMEN

During the Committee's deliberations, including the public hearing, the issue has been raised of increasing the participation of women in biomedical and behavioral research. In its 1977 report the Committee presented the results of a study it conducted, using available data sources, on the career and training patterns of women. While it was noted that much progress has been made in the past decade in increasing the representation of women in biomedical and behavioral research, it was also pointed out that many continuing hindrances remain to their full participation. The special problem of family responsibility resulting in interruption of or late entry into training and careers (see section below on midcareer training), financial burdens, and greater reliance than men on part-time study, point to the particular difficulties of increasing the number of women researchers.

In December 1974, the National Research Council (NRC) appointed a Committee on the Education and Employment of Women in Science and Engineering to examine the social, structural, and institutional constraints which limit the participation of women in science and engineering, giving special attention to problems of sex discrimination in education and employment. Its goal is to increase official and public understanding of these issues and serve as a focus for efforts to improve opportunities for women in science and engineering, thereby increasing utilization of a largely untapped reservoir of talent. Initially the Committee is examining the utilization of women doctoral scientists in three areas: 1) postdoctoral positions; 2) academic employment; and 3) federal advisory boards and ad hoc committees. Because of the relevance of these studies to assessments of supply and demand for research personnel in the biomedical and behavioral sciences, the findings of that Committee will be studied with much interest.

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MIDCAREER TRAINING

Although in last year's report the Committee made a specific recommendation to provide up to 50 percent of health services research fellowships for midcareer training for qualified persons interested in entering this new research area, the issue of midcareer training has arisen across a broad spectrum of the Committee's deliberations. Each of the training areas for which the Committee is responsible has experienced problems associated with late entry, reentry, or retraining after the traditional period of graduate and postdoctoral training. Retraining often is required because of the rapid pace of developments in science and the early obsolescence of techniques and instruments in almost every field.

In the clinical sciences, this problem is acute because of the lengthy schooling and residency requirements involved prior to entering full-time research training and particularly because of the many demands placed upon the time of M.D.-investigators, particularly those in academic medical centers and major hospitals/clinics, to provide health care services. Such persons generally are unable to devote the majority of their time to research and, by virtue of the conditions and responsibilities of their employment, either are ineligible for support for, or otherwise unable to take, a sabbatical leave of absence to acquire new research skills and knowledge.

Midcareer training needs are particularly relevant to the problem of attracting and retaining minorities and women in research. Providing opportunities for minorities and women in fields in which their participation has heretofore been minimal will require midcareer opportunities for training in these fields. For minorities, the attractiveness of immediate employment opportunities following receipt of the doctorate may divert some from needed postdoctoral training and, once they are employed, abnormally high administrative and student counseling demands become obstacles to achieving high research productivity. For women, family responsibilities often create training problems because of late entry into training and careers, limits to full-time study, and obsolescence of research skills due to a midcareer hiatus. For example, in the area of nursing research these problems frequently exist for individuals already engaged in professional careers who desire to enter research in this expanding area.

It is not yet possible to describe a single program that would be simple, yet comprehensive enough to encompass the variety of training needs demonstrated by such a varied group of individuals. Adequate stipend levels may be critical to permitting those in midcareer to undertake additional training. Part-time study may be essential to those with continuing family responsibilities. In addition, predoctoral training will be required for those first entering research training, while postdoctoral training may be sufficient for those retooling for a resumption of research or an upgrading of research skills.

The Committee believes that these problems associated with the need for midcareer training need to be explored in greater depth. It therefore will seek to address these issues in future studies in order to define them more precisely and to determine the nature and extent of the efforts needed for amelioration. The Committee also urges the federal agencies to devote additional attention to these problems for the purpose of better defining aspects of agency responsibility for meeting these needs.

OVERALL RECOMMENDATIONS FOR FEDERAL SUPPORT

In the following sections, the Committee will summarize its recommendations with regard to the mechanisms of support and the numbers of individuals to be supported.

Mechanisms of Support

The Committee wishes to reaffirm its recommendation of last year that both basic mechanisms of support--fellowships and training grants--be maintained. The Committee believes that these two mechanisms are complementary in their support of high quality training--the individual support of high quality students through fellowships and the bolstering of superior training programs through training grants. Because the needs and problems of research training differ among the various scientific areas with which the Committee is concerned, the type and magnitude of support provided must be made appropriate to the area and level of training involved.

Recommendation. As in last year's report the Committee recommends that the federal government continue to support and maintain both training grant and fellowship programs in the biomedical and behavioral sciences. Specific recommendations for each of the broad areas are reported in the following chapters.

Numerical Recommendations

The Committee has adopted the practice of making its recommendations for 3 fiscal years (FY) in advance of the year of publication of its reports. This practice is intended to provide Congress and the agencies with sufficient time for consideration and implementation of the recommendations which in this year's report cover FY 1980, 1981, and 1982. The recommendations for FY 1980 are considered firm, while those for FY 1981 and 1982 are tentative and subject to revision in next year's report.

This year the Committee presents its numerical recommendations and the agencies' training data in a different and somewhat more detailed format. Three specific subareas of training, which are described in the sections below and which heretofore have been subsumed under one of the five major training areas (biomedical sciences, behavioral sciences, clinical sciences, health services research, and nursing research), are now separately identified and, in some cases, reclassified.

The first of these is the Medical Scientist Training Program (MSTP). In previous Committee reports this program has been classified under the clinical sciences, but since the training provided under this program is heavily oriented toward the basic biomedical sciences, and since NIH routinely reports MSTP data in this category, the Committee believes it to be more appropriate to classify the MSTP under that general heading. Thus it is identified separately under the biomedical sciences in the tables that follow.

A second subarea training category for which the agencies' award data are separately identified is Community and Environmental Health. Support for this subarea reflects NIH interest in public health and sanitation and includes such fields as radiological health, water pollution control, air pollution, environmental sciences, food protection, mental health,[1] maternal and child health, and accident prevention. In past reports, trainees in this category of community and environmental health research training generally have been allocated to either the biomedical or clinical sciences. However, in its continuing review of training areas, the Committee has concluded that since many of the individuals working in these fields have been drawn from the biomedical sciences, agency data on training awards for the Community and Environmental Health category henceforth will be shown separately within the biomedical sciences area.

Finally, the important fields of biostatistics and epidemiology constitute a third training category separately identified in this report. Agency training data for these fields also have been previously reported partially within the basic biomedical sciences and partially within the clinical sciences. In keeping with the Committee's recommendations this year concerning the preferred locus for predoctoral training in these fields, data on awards are now consolidated and shown under the category of biomedical sciences.

While these modifications do not change any of the overall levels of training previously recommended by the Committee, they do result in some rearrangement of the recommendations in the clinical science and biomedical science areas.

The tables that follow present agency training data for FY 1977; the Committee's recommendations and estimated costs for FY 1980-82; and an overall summary from FY 1975-82 of authorization, appropriation, and Committee recommended levels. Figure 1.1 restates the Committee's recommendations from FY 1975 in terms of the changes discussed above (see also Appendixes D1-D2 for tables showing the Committee's recommendations for 1976 and 1977 in the new format).

Table 1.1 shows the training awards provided by the agencies in FY 1977 in terms of the Committee's five major research training areas and the three new training categories discussed above.

Table 1.2 and Figure 1.1 show the numerical recommendations of the Committee for FY 1980-82, by training area, program type (traineeship or fellowship), and academic level (predoctoral or postdoctoral), without attempting to allocate the training positions among NIH, ADAMHA, Health Resources Administration (HRA), and NCHSR.

Table 1.3 presents the Committee's recommendations in percentages. If the funds appropriated by Congress for research training differ from the recommended levels, the percentage format may be helpful in assisting agencies to implement the recommendations.

Table 1.4 translates the numerical recommendations into estimated costs. The reader is cautioned that, as noted in the footnote, other than allowing for an annual 5 percent increase in stipends, estimated costs do not provide for possible increases in tuitions, indirect costs, etc.

Finally, for comparative purposes, Table 1.5 provides a summary of the authorization levels, amounts appropriated, and the Committee's recommended levels of support for the NRSA program from FY 1975 through FY 1982.

TABLE 1.1 NIH/ADAMHA/HRA Trainee and Fellowship Awards for FY 1977

			Total	Biomedical Sciences				Behavioral Sciences	Clinical Sciences	Health Services Research	Nursing Research
				Basic	Medical Scientist Program	Epidemiology and Biostatistics	Community and Environmental Health Fields[a]				
GRAND TOTAL NIH, ADAMHA, and HRA	Total	Total	12,261	6,526	497	210	185	1,710	2,891	144	98
		Pre	6,635	3,809	497	127	105	1,340	587	79	91
		Post	5,626	2,717	0	83	80	370	2,304	65	7
	Trainees	Total	10,069	5,014	497	201	176	1,428	2,602	144	7
		Pre	6,379	3,754	497	127	105	1,229	587	79	1
		Post	3,690	1,260	0	74	71	199	2,015	65	6
	Fellows	Total	2,192	1,512	0	9	9	282	289	0	91
		Pre	256	55	0	0	0	111	0	0	90
		Post	1,936	1,457	0	9	9	171	289	0	1
NIH[b]	Total	Total	10,370	6,132	497	210	185	455	2,891	0	0
		Pre	5,297	3,614	497	127	105	367	587		
		Post	5,073	2,518	0	83	80	88	2,304		
	Trainees	Total	8,587	4,725	497	201	176	386	2,602	0	0
		Pre	5,289	3,606	497	127	105	367	587		
		Post	3,298	1,119	0	74	71	19	2,015		
	Fellows	Total	1,783	1,407	0	9	9	69	289	0	0
		Pre	8	8		0	0	0	0		
		Post	1,775	1,399		9	9	69	289		
ADAMHA	Total	Total	1,793	394	0	0	0	1,255	0	144	0
		Pre	1,247	195				973		79	
		Post	546	199				282		65	
	Trainees	Total	1,475	289	0	0	0	1,042	0	144	0
		Pre	1,089	148				862		79	
		Post	386	141				180		65	
	Fellows	Total	318	105	0	0	0	213	0	0	0
		Pre	158	47				111			
		Post	160	58				102			
HRA Division of Nursing	Total	Total	98	0	0	0	0	0	0	0	98
		Pre	91								91
		Post	7								7
	Trainees	Total	7	0	0	0	0	0	0	0	7
		Pre	1								1
		Post	6								6
	Fellows	Total	91	0	0	0	0	0	0	0	91
		Pre	90								90
		Post	1								1

[a] Includes mental health, disease prevention and control, occupational health, water pollution control, air pollution, food protection, and other training fields (see Appendix D3 for the complete list).

[b] Excludes 192 non-NRSA postdoctoral fellowship awards by the Fogarty International Center.

SOURCE: Division of Research Grants, NIH, April 25, 1978; Office of the Administrator, ADAMHA, March 9, 1978.

TABLE 1.2 Committee Recommendations for NIH/ADAMHA/HRA Traineeship and Fellowship Awards for FY 1980-82

			Total	Biomedical Sciences		Behavioral Sciences[a]	Clinical Sciences[b]	Health Services Research	Nursing Research
				Basic[c]	Medical Scientist Program				
1980	Total	Total	12,880	7,450	725	1,390	2,800	275	240
		Pre	5,915	4,250	725	575	0	160	205
		Post	6,965	3,200	0	815	2,800	115	35
	Trainees	Total	8,785	4,250	725	1,140	2,400	205	65
		Pre	5,620	4,250	725	470	0	120	55
		Post	3,165	0	0	670	2,400	85	10
	Fellows	Total	4,095	3,200	0	250	400	70	175
		Pre	295	0	0	105	0	40	150
		Post	3,800	3,200	0	145	400	30	25
1981	Total	Total	12,845	7,450	725	1,300	2,800	300	270
		Pre	5,770	4,250	725	390	0	175	230
		Post	7,075	3,200	0	910	2,800	125	40
	Trainees	Total	8,760	4,250	725	1,065	2,400	225	95
		Pre	5,505	4,250	725	320	0	130	80
		Post	3,255	0	0	745	2,400	95	15
	Fellows	Total	4,085	3,200	0	235	400	75	175
		Pre	265	0	0	70	0	45	150
		Post	3,820	3,200	0	165	400	30	25
1982	Total	Total	12,905	7,450	725	1,300	2,800	330	300
		Pre	5,810	4,250	725	390	0	190	255
		Post	7,095	3,200	0	910	2,800	140	45
	Trainees	Total	8,815	4,250	725	1,065	2,400	250	125
		Pre	5,540	4,250	725	320	0	140	105
		Post	3,275	0	0	745	2,400	110	20
	Fellows	Total	4,090	3,200	0	235	400	80	175
		Pre	270	0	0	70	0	50	150
		Post	3,820	3,200	0	165	400	30	25

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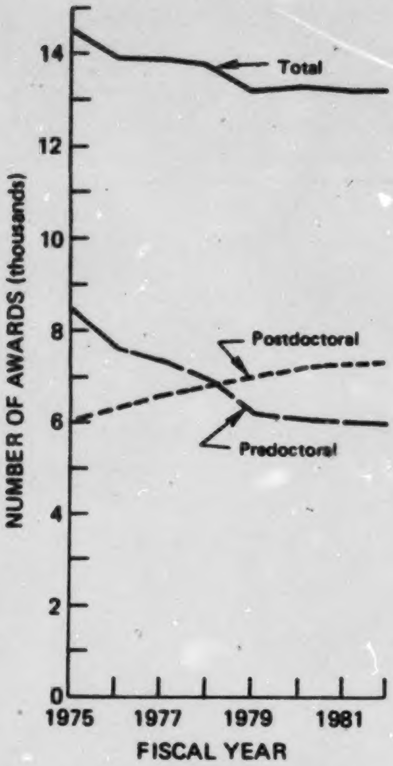
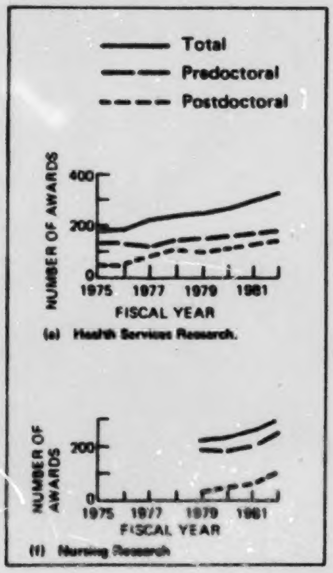
[a] The allocation of awards in the behavioral science awards between traineeships and fellowships is based on the distribution that prevailed in FY 1976, i.e., 82 percent traineeships, 18 percent fellowships.

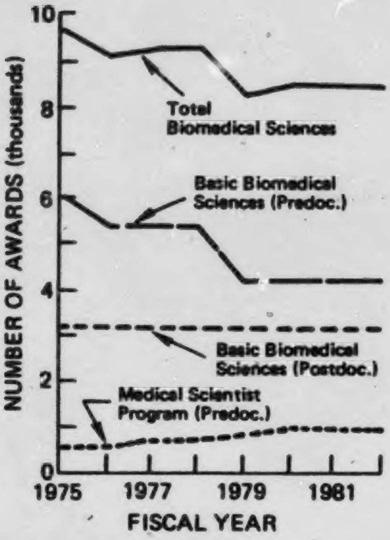
[b] In previous reports, the Committee's recommendations for the Medical Scientist Training Program were included under the clinical sciences area.

[c] Recommendations for biostatistics, epidemiology, community and environmental health, and other training fields not specifically shown in this table are included here.

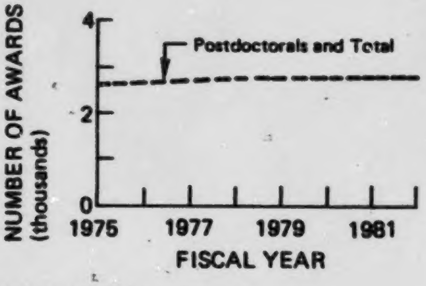


(a) Total Recommended Predoctoral and Postdoctoral NRSA Awards

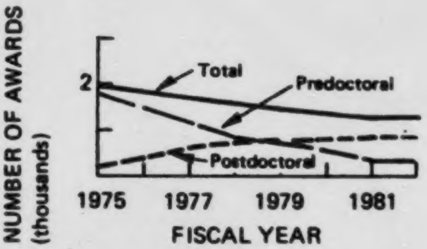




(b) Biomedical Sciences



(c) Clinical Sciences



(d) Behavioral Sciences

FIGURE 1.1 Summary of Committee recommendations for NIH, ADAMHA, and HRA research training awards. Training grant awards are made at the end of a fiscal year and support trainees on duty in the subsequent fiscal year. Fellowship awards are made throughout the fiscal year in which the training occurs and in this report it is assumed that the fellowship awardee starts his training in the fiscal year of the award. See Table 1.2.

TABLE 1.3 Percentage Distribution of Recommended NIH/ADAMHA/HRA Traineeship and Fellowship Awards for FY 1980-82

			Total	Biomedical Sciences		Behavioral Sciences[a]	Clinical Sciences[b]	Health Services Research	Nursing Research
				Basic[c]	Medical Scientist Program				
	Recommended awards		12,880 (100%)	7,450 (57.8%)	725 (5.6%)	1,390 (10.8%)	2,800 (21.7%)	275 (2.1%)	240 (1.9%)
1980	Total	Total	100	100	100	100	100	100	100
		Pre	46	57	100	41	0	58	85
		Post	54	43	0	59	100	42	15
	Trainees	Total	68	57	100	82	86	75	27
		Pre	43	57	100	34	0	43	23
		Post	25	0	0	48	86	32	4
	Fellows	Total	32	43	0	18	14	25	73
		Pre	3	0	0	7	0	15	62
		Post	29	43	0	11	14	10	11
	Recommended awards		12,845 (100%)	7,450 (57.9%)	725 (5.6%)	1,300 (10.1%)	2,800 (21.8%)	300 (2.3%)	270 (2.1%)
1981	Total	Total	100	100	100	100	100	100	100
		Pre	45	57	100	30	0	58	85
		Post	55	43	0	70	100	42	15
	Trainees	Total	68	57	100	82	86	75	35
		Pre	43	57	100	25	0	43	30
		Post	25	0	0	57	86	32	5
	Fellows	Total	32	43	0	18	14	25	65
		Pre	3	0	0	5	0	15	55
		Post	29	43	0	13	14	10	10
	Recommended awards		12,905 (100%)	7,450 (57.7%)	725 (5.6%)	1,300 (10.1%)	2,800 (21.7%)	330 (2.6%)	300 (2.3%)
1982	Total	Total	100	100	100	100	100	100	100
		Pre	45	57	100	30	0	58	85
		Post	55	43	0	70	100	42	15
	Trainees	Total	68	57	100	82	86	75	42
		Pre	43	57	100	25	0	43	35
		Post	25	0	0	57	86	32	7
	Fellows	Total	32	43	0	18	14	25	58
		Pre	3	0	0	5	0	15	50
		Post	29	43	0	13	14	10	8

[a] The allocation of awards in the behavioral science awards between traineeships and fellowships is based on the distribution that prevailed in FY 1976, i.e., 82 percent traineeships, 18 percent fellowships.

[b] In previous reports, the Committee's recommendations for the Medical Scientist Training Program were included under the clinical sciences area.

[c] Recommendations for biostatistics, epidemiology, community and environmental health, and other training fields not specifically shown in this table are included here.

TABLE 1.4 Estimated Cost of Recommended NIH/ADAMHA/HRA Programs for FY 1980-82, Based on FY 1976 Costs,[a] (millions of dollars)

			Total	Biomedical Sciences		Behavioral Sciences	Clinical Sciences	Health Services Research	Nursing Research
				Basic	Medical Scientist Program				
1980	Total	Total	167.00	82.42	6.62	20.10	51.64	3.70	2.53
		Pre	51.16	35.38	6.62	5.64	0	1.53	1.99
		Post	115.84	47.04	0	14.45	51.64	2.17	0.54
	Trainees	Total	107.72	35.38	6.62	16.90	45.36	2.85	0.63
		Pre	48.14	35.38	6.62	4.57	0	1.12	0.46
		Post	59.58	0[b]	0	12.33	45.36	1.73	0.17
	Fellows	Total	59.28	47.04	0	3.20	6.28	0.85	1.90
		Pre	3.02	0	0	1.07	0	0.41	1.53
		Post	56.26	47.04	0	2.13	6.28	0.44	0.37
1981	Total	Total	174.06	85.78	6.79	20.72	53.70	4.17	2.90
		Pre	51.06	36.38	6.79	3.92	0	1.71	2.25
		Post	123.01	49.40	0	16.80	53.70	2.46	0.65
	Trainees	Total	111.93	36.38	6.79	17.45	47.12	3.24	0.95
		Pre	48.29	36.38	6.79	3.19	0	1.24	0.68
		Post	63.64	0[b]	0	14.26	47.12	2.00	0.27
	Fellows	Total	62.13	49.39	0	3.28	6.57	0.93	1.96
		Pre	2.77	0	0	0.73	0	0.47	1.57
		Post	59.36	49.39	0	2.55	6.57	0.46	0.39
1982	Total	Total	181.75	89.30	6.97	21.52	55.86	4.80	3.31
		Pre	52.86	37.44	6.97	4.02	0	1.91	2.53
		Post	128.89	51.86	0	17.50	55.86	2.89	0.78
	Trainees	Total	116.55	37.44	6.97	18.10	48.98	3.77	1.29
		Pre	49.97	37.44	6.97	3.27	0	1.37	0.92
		Post	66.58	0[b]	0	14.83	48.98	2.40	0.37
	Fellows	Total	65.20	51.86	0	3.42	6.88	1.03	2.02
		Pre	2.89	0	0	0.75	0	0.54	1.61
		Post	62.31	51.86	0	2.67	6.88	0.49	0.41

[a] Calculations were based on 1976 average cost figures (see below) derived from NIH data. No allowance has been made for increases in tuition charges or other training costs except for the 5 percent per year increase in stipends as noted below. Substantial increases in tuition charges have been noted in recent years. If, as expected, tuition should continue to increase from 1976 levels, the above estimates should be adjusted accordingly.

[b] Although no specific awards are recommended here, the Committee recognizes the need for special exceptions to be made.

Estimated Total Training Costs Per Award in FY 1976 (dollars)

	Predoctoral					Postdoctoral				
FY 1976	Biomed	Behavioral	Clinical	Health Serv.	Nursing	Biomed	Behavioral	Clinical	Health Serv.	Nursing
Trainees	8,100	9,500	8,900	9,100	8,100	16,300	17,700	18,200	19,600	16,300
Fellows	10,000	10,000	10,000	10,000	10,000	14,000	14,000	15,000	14,000	14,000

A 5 percent increase per year on stipends was assumed in accordance with Committee's recommendation. The average stipend for predoctoral was estimated to be $4,500; the average stipend for postdoctoral [illegible] estimated at $14,000 in 1976.

TABLE 1.5 Authorization, Appropriation, and Committee Recommendations for Training Expenditures, 1975-82 (millions of dollars)

	Fiscal Year							
	1975	1976[a]	1977	1978	1979	1980	1981	1982
Authorized								
NRSA Act[b]	208	165	185	185				
House					220	240	260	
Senate					175	180	185	
Appropriated[c]	171.5	152.0	146.5	168.8				
NIH	154.9	132.3	127.4	149.9				
ADAMHA	16.6	19.7	19.1	18.9				
Committee Recommendations[d]		168	167	167	164	167	174	182

[a] Includes the transition quarter.

[b] See NRSA Act in Appendix A.

[c] From budget offices of NIH and ADAMHA.

[d] See Committee reports for 1976 and 1977.

ADDENDA

REVIEW OF CURRENT ACTIVITIES

Solicitation of Views from the Public

For the second consecutive year, the Committee conducted a public hearing to solicit comments from individuals and organizations about the Committee's work (see Appendix C3 for the program). The purpose was to continue the dialogue established at the first public hearing between the Committee and the public. Once again, the hearing was scheduled several months after the widespread distribution of the Committee's annual report.

The hearing proved educational for both Committee and public. The Committee received comments, criticisms, and suggestions directly from interested parties and sought clarification of stated positions through direct questioning. Speakers and other attendees learned through the Committee's questions some of the larger issues that continue to emerge from the congressional charge to the Committee. A full schedule of 35 speakers covered a broad range of topics including the need for minority fellowships, midcareer training for women, nonacademic demand for researchers, the need for problem-oriented interdisciplinary training, predoctoral versus postdoctoral field specialization, and field-switching at the postdoctoral level. Attention was also directed to predoctoral priority training areas and to training needs in such areas as epidemiology, toxicology, and the evaluation of health services. Particular consideration was given to the special needs of research in the clinical sciences carried on by investigators with professional degrees in medicine, dentistry, veterinary medicine, clinical psychology, and nursing.

The Committee was particularly pleased that some groups heeded the Committee's request of the previous year to provide concrete evidence of future demand for researchers. In particular, data were provided concerning the employment and utilization of Ph.D.'s in psychology and microbiology. In addition, attempts were made to demonstrate the increasing demand for toxicologists. While the Committee's interpretation of the significance of these data may vary somewhat from that of the presenters, these sources do further the Committee's goal of providing a sounder basis on which to make judgments about training needs.

The transcript of the hearing together with written statements submitted prior and subsequent to the hearing were considered by the Committee and its advisory panels. While no attempt has been made to address specifically every statement contained in this extensive documentation, the Committee and panels have given these viewpoints serious attention in making their own findings and recommendations.

Dissemination of Market Information

In its 1977 report the Committee recommended that students contemplating research careers in the biomedical sciences "be provided access to the most current and valid data about the state of the labor market and career opportunities." An article (Coggeshall, et al., in press) has been been prepared on the changing employment situation for recent Ph.D recipients in the biomedical sciences, based largely on data collected in the Committee's 1976 survey of recent graduates. The article focuses on the postdoctoral buildup in these fields and its implications for graduate students planning careers in biomedical research. The following two questions are specifically addressed:

1) To what extent does the continuing increase in postdoctorals reflect a diminution in permanent positions available for young scientists to enter academic and other careers?

2) How many of those now on postdoctoral appointments will be able to find suitable employment when they complete their training?

In an effort to disseminate data describing the current market for behavioral science personnel, papers have been delivered at the annual meetings of the American Association for the Advancement of Science (AAAS) and the American Psychological Association (APA) (Ebert-Flattau, 1978a and b).

Survey of Biomedical and Behavioral Science Departments

This survey, hereafter referred to as the Department Survey, was designed to serve a variety of purposes relating to training and labor market issues in the basic biomedical and behavioral science areas. The entire population of doctoral granting departments in these areas was surveyed--1,324 biomedical and 474 behavioral sciences departments. A response rate of 77 percent was achieved. The department was selected as the survey unit because of its unique locus as training center, research center, and employer. Responses were analyzed by differences in field and by various department characteristics: quality rating, public or private institution, graduate or medical school, and age of the department.

The Committee was particularly interested in three major issues. The first is how departmental policy affects admissions and full-time enrollments. Are some types of departments more likely than others to restrict enrollments based on available stipend support or perceptions of the labor market? A second issue was the current perceptions of the labor market. Is the market seen as being in balance or as having shortages or surpluses? What are anticipated trends in full-time enrollments and demand for faculty through 1981? Is there any evidence of a postdoctoral holding pattern due to a worsening job market? The third issue is the impact of lost training grant support on full-time enrollments and programs. To what extent can alternative sources and mechanisms of support substitute for the loss of training support? Are there unique program benefits associated with the training grant that would be lost with the demise of this program?

Results from the Department Survey pertaining to these issues are discussed in Chapters 2 and 3 as appropriate to the basic biomedical and behavioral sciences. Data from the survey are provided in Appendix E.

Several departmental site visits were conducted by the Panel on Basic Biomedical Sciences to supplement results from the Department Survey. These site visits were designed to help assess the role of training grants in university programs; special emphasis was placed on the impact of the loss of such support on the quality of departmental programs. While these site visits were preliminary in nature and therefore not conclusive, they did add valuable insights to the findings of the Department Survey.

Surveys of Doctoral and Pending Doctoral Programs for Nurses

In response to a continued need for data describing the current climate for doctoral training in nursing research, the Committee and its Ad Hoc Advisory Group on Nursing Research Personnel conducted surveys of selected doctoral and pending doctoral programs in schools of nursing throughout the United States.

In conjunction with a survey form used to collect basic information describing enrollment trends, faculty activities, and research development, deans at 15 schools of nursing were interviewed by Committee staff.

Findings from these surveys (Appendix I) suggest that doctoral programs have been proliferating at a rate faster than that at which research and the number of research faculty have been growing at these institutions. These findings, together with Committee recommendations, are presented in Chapter 6.

Survey of Health Services Research Personnel

The Committee, together with its Panel on Health Services Research, initiated a survey in June 1978 of approximately 2,000 individuals who were identified as health services research personnel on the basis of having received federal research grant, contract, or training support in related areas. Findings from this survey were not available in time for inclusion in this year's report.

At a time when a concerted effort is under way by the federal government to review and assess its involvement in health services research and its support of research training (see Chapter 5), the Committee believes that the findings from this survey will provide important information regarding the past research training experiences and current employment opportunities for these investigators.

Conference on Health Services Research Personnel

On May 17, 1978, the Committee and its Panel on Health Services Research convened a 1-day invitational conference in Washington, D.C., to discuss with representatives from a variety of employment settings current and anticipated employment opportunities for this type of investigator. Evidence provided by conference participants led the Committee to conclude that there is an urgent need to provide skilled investigators to conduct research relevant to the implementation of such federally mandated programs as Health Systems Agencies (HSA) and Community Mental Health Centers (CMHC). A full discussion of the conference is found in Chapter 5 (see Appendix C4 for program and conferees).

Meeting on Veterinary Research

On April 20, 1978, an ad hoc Working Group on Veterinary Research Personnel, under the aegis of the Panel on Clinical Sciences, met to discuss training and employment problems in this area. Professional society representatives presented information on the employment of individuals in the veterinary sciences. In addition, the work group discussed financial and institutional constraints to entrance into research careers by D.V.M. students. Plans were formulated for future studies to clarify training and personnel needs for veterinary scientists. (See Appendix C1 for program and participants.)

Meeting on Dental Research

A work group on dental research personnel, under the Panel on Clinical Sciences, met on May 11, 1978, to discuss problems in defining the dental research population and estimating personnel needs in dental research. In particular, the work group discussed the unique dental research training problems created by the link between research and clinical specialties and particularly the important issues of the inadequate amount and duration of stipend support. The meeting resulted in an agreement to cooperate with the American Association for Dental Research in undertaking a study of the dental research population. (Appendix C2 contains the program and list of participants.)

Meeting on Psychiatry Research Personnel

On January 21, 1978, the Committee and its Panel on Behavioral Sciences convened a 1-day meeting in Washington, D.C., to identify the most pressing challenges confronting the recruitment of psychiatrists into mental health research. In addition to the need to strengthen research training sites and to recruit personnel at critical career choice points, the ad hoc steering committee pointed to the need to foster more interdisciplinary research through research training.

The conclusions drawn by the steering committee served as guidelines for the discussion found in Chapter 3. (See Appendix C5 for program and participants.)

RELATED STUDIES

Study of Postdoctorals

The Committee is also following the work of the NRC Committee on Postdoctorals and Doctoral Research Staff in Science and Engineering, which is studying the changing roles of these personnel in science and engineering fields and the implications for federal and institutional policy decisions. This study will address a number of issues pertinent to the need for biomedical and behavioral research personnel including 1) the character of the contribution of postdoctoral appointees to the research effort of their host departments and laboratories; 2) the desirability, from the student's perspective, of taking a postdoctoral appointment; 3) the appropriate mix of postdoctoral funding mechanisms;

4) the contributions and costs of foreign nationals on postdoctoral appointments at United States institutions; 5) the advantages and disadvantages of postdoctoral training from the perspective of women and minorities; and 6) the advantages and disadvantages of postdoctoral training for students planning careers outside the academic sector. For purposes of addressing these issues, several data-gathering activities have been planned for the next 2 years. Efforts are being made to coordinate these activities with those planned by the Committee so that both the total cost and survey burden will be minimized.

NIH Market Survey

As mentioned in the Committee's report last year, NIH contracted with Westat, Inc., in 1975 to conduct a survey of the market for biomedical scientists. The survey was done in two phases. The first phase was conducted in May 1975, to derive national estimates of the number of budgeted positions available and the supply of new entrants into the biomedical research labor force. A follow-up phase, conducted in September 1975, was designed to assess the manner in which the positions were filled and the degree of success that employers had in finding suitable candidates.

This survey drew a stratified sample of employers to cover all sectors, including academia, private industry, government, and hospitals. Employers were asked to list all budgeted vacancies in the biomedical science fields for research, teaching, or administrative positions expected to become available between May and September 1975. Those organizations that also trained biomedical researchers (mainly academic institutions) were asked to specify the number of individuals expected to complete their training between May and September 1975. Completion of training could mean either the attainment of the Ph.D degree or completion of a postdoctoral fellowship. A discussion of the results of this survey appears in Chapter 2 (Basic Biomedical Sciences). The survey was repeated in 1977, and its results are expected to be announced shortly.

NIMH Professional Training Assessment

During its deliberations regarding training needs for health professionals in mental health research (Chapter 3), the Committee and its Panel on Behavioral Sciences utilized the findings of the 1972-73 National Institute of Mental Health (NIMH) follow-up study of health professionals who had once received predoctoral or postdoctoral training support some time between 1948 and 1968 (ADAMHA, 1977).

Published as a profile of the "Professional Characteristics and Work Patterns of Mental Health Personnel Supported Under NIMH Training Grants, 1948-1968," this report provides useful data regarding recent work activities, types of employment, and related characteristics for a significant portion of the total number of individuals having received such support over the years. The Committee looks forward to the continued availability of such information from the Division of Manpower and Training Programs of NIMH.

FOOTNOTE

1. The NIH training programs in the field of mental health are small compared to those of ADAMHA. For 1977, only the National Institute of Child Health and Human Development (NICHD) supported training in this field (45 trainees).

2. BASIC BIOMEDICAL SCIENCES

During the past year, the Committee and its advisory Panel on Basic Biomedical Sciences have reconsidered each of the recommendations in last year's report. Particular attention has been given to 1) updating the model projecting supply and demand for biomedical research personnel; 2) evaluating the impact that recent reductions in training grant support have had on graduate programs; and 3) identifying priority training fields in the biomedical sciences. In evaluating the impact of lost training grant support, the Committee relied on findings from a detailed survey of all 1,324 basic biomedical science departments with doctoral programs and on impressions gathered on site visits to a selected group of departments that had recently lost training grant support. In an attempt to identify priority training fields, consideration was given to statements received at the Committee's public hearing in February 1978 and to discussions that were held with several diverse groups, including members of an NIH advisory council, a professional society executive committee, federal agency officials responsible for setting training priorities, and other informed individuals.

ASSESSMENT OF THE CURRENT MARKET FOR BASIC BIOMEDICAL SCIENTISTS

Last year the Committee examined information on current employment opportunities for scientists with doctoral training in the biomedical fields. This information was obtained from a survey of 7,800 individuals who earned Ph.D. degrees in these fields between 1971 and 1975 (cited as "Survey of Recent Doctorate Recipients"). Survey findings revealed that all but a few of these graduates were utilizing their doctoral training and that no serious unemployment problem was apparent. However, significant increases were noted in both the number of biomedical Ph.D. recipients taking postdoctoral appointments and the length of their postdoctoral training period. The Committee's concern over the growth in the postdoctoral pool was highlighted in its 1977 report (p. 44):

> During a period (1972-75) when the number of biomedical Ph.D.'s awarded annually had increased very little, the total number of persons holding postdoctoral appointments expanded at an annual rate of more than 13 percent. This rapid growth (from 3,039

> appointees in 1972 to 4,455 in 1975) came as a result of increases in both the number of graduates taking postdoctorals and the length of these appointments.

A large percentage (42 percent) of these postdoctoral appointees said that they remained in that status because they could not find a more permanent position. As noted in a report to the Committee on the labor market for biomedical scientists (Freeman, 1977), the proportion of new biomedical Ph.D. recipients who are seeking jobs but are without specific prospects at the time of graduation has increased markedly since 1970.

Projections from a model developed by the Committee to estimate future needs for biomedical scientists in the academic sector indicated that supply is likely to exceed demand significantly during the next 5 years. On the basis of these projections and the survey findings, the Committee recommended 1) a reduction in predoctoral support for research training in the basic biomedical sciences and 2) a stabilization of postdoctoral support in these fields. After comparing the employment prospects in different biomedical specialty fields, the Committee concluded that, with the exceptions of biomathematics/ biostatistics and epidemiology, no fields should be given priority for predoctoral support.

In April 1977, NIH reported that a survey of the market for biomedical scientists in all employment sectors, conducted for NIH by Westat, Inc., showed that shortages of biomedical scientists existed in most fields in 1975 (NIH, 1977a). In almost every field, the number of unfilled positions exceeded the number of individuals still seeking positions. Hence, NIH concluded that substantial shortages existed. The shortages were reported to be more severe for M.D.'s with research training than for Ph.D.'s. These widespread shortages were contrary to the employment situation observed in most other scientific areas.

In concluding from the Westat survey's results that manpower shortages existed in most biomedical fields in 1975, NIH relied heavily on the number of budgeted vacancies that remained unfilled in September 1975. Of the estimated 3,500 vacancies reported in May, 42 percent remained unfilled in September. The major reason positions were not filled was reported to be the lack of suitable candidates.

On the supply side, NIH reported that most of the individuals completing programs between May and September 1975 found either a job or a postdoctoral appointment by September, although 6 percent were still seeking positions.

The Committee's findings agree with the NIH assessment of the market for M.D.'s but disagree with the NIH conclusion with respect to the market for biomedical Ph.D.'s. The discrepancies between NIH's and the Committee's assessments of the current market situation for biomedical Ph.D.'s are largely due to differing methodological approaches and interpretations of the data collected from both of the Committee's surveys and from the NIH survey conducted by Westat. Some possible reasons for the differences are given below.

1) In the Westat survey, postdoctoral positions were counted as part of the demand. The Committee believes, however, that postdoctoral appointments are temporary positions intended primarily for training and cannot be considered equivalent to faculty appointments or other more permanent positions, as they were in the Westat survey. Indeed, the Committee believes that a large portion of the individuals on postdoctoral appointments are candidates for permanent positions and thus should be counted on the supply side.

2) The Westat survey asked the reason for not filling the vacancies remaining in September, 1975. Was the lack of a suitable candidate the major reason for not filling the position? The answer has a bearing on the interpretation of the survey's results. Although verification is difficult due to the low response to the question, and unpublished data indicate considerable variation among fields with respect to the major reason, the failure to find a suitable candidate was cited in only a small portion of cases in many basic biomedical fields. In biochemistry, for example, of the 181 unfilled positions, only 32 (18 percent) cited this reason; in microbiology the lack of a suitable candidate was cited in only 6 percent of the cases; in pharmacology it was only 3 percent, whereas in anatomy it was 56 percent. More often than not, no reason at all was given for the unfilled positions (Westat, Inc., 1976, pp. 3-11, unpublished). In certain clinical fields the failure to find a suitable candidate was clearly the major reason. In pediatrics it was cited in 58 percent of the cases, and in medicine it was 34 percent.

3) Another interpretation of the Westat results seems more supportable. It is likely that the unfilled positions represent "market friction" rather than shortages. At any given time, there will likely be unfilled positions in the market, even in periods of surplus manpower. A certain amount of searching by both employers and job seekers is normal in any market situation. The survey results indicate that those completing programs in May had no better luck in filling their job expectations than employers had in filling their jobs. Of the 1,421 persons who completed programs and who said they were seeking new positions in May, only 540 (38 percent) found new positions by September (Westat, Inc., 1976, Table 17, p. 4-4). Employers seemed to have had more success, filling 1,794 out of 3,461 positions, or more

than 50 percent of the vacancies. Both the unfilled positions and the remaining number of job seekers may be more a reflection of communication difficulties (i.e., market friction) than market imbalances.

Another approach to the evaluation of the current market is to analyze the perceptions of bioscience department chairpersons concerning their recent experience in placing Ph.D.'s and postdoctorals. Findings from the Department Survey offer a complex picture of the current market situation, with some fields clearly reporting shortages and others surpluses (Appendixes E12 and E13). Overall, there emerges a perception of overall market equilibrium, as shortage and surplus fields appear to balance off each other. Shortages are reported in such clinically oriented bioscience fields as anatomy, pharmacology, and pathology, while basic bioscience fields such as biochemistry, physiology, and biology report surpluses.

Findings from the Department Survey are therefore at variance with those from the NIH/Westat survey. Where the NIH/Westat survey reports shortages of Ph.D. biochemists, biologists, and physiologists in 1975, many department chairpersons came to the opposite conclusion in 1977 (Table 2.1). Of the fields reported upon in both the surveys, only in anatomy and pharmacology do the surveys agree that shortages of biomedical Ph.D.'s existed.

A repeat of the 1975 Westat survey was conducted in 1977, the results of which are expected to be announced shortly. The Committee welcomes the opportunity to review these and compare them with the information being collected from other sources. Because of the methodology problems noted above, however, the results of the first NIH/Westat market survey do not convince the Committee that its assessment of the current market for biomedical Ph.D.'s is erroneous.

THE 1978 OUTLOOK FOR PH.D.'s

The market for Ph.D.'s in the basic biomedical sciences is a dynamic system subject to decisions concerning R and D funding levels on the one hand and career decisions by undergraduate and graduate students on the other. Each year additional data relating to the system become available through surveys such as those conducted by the U.S. Office of Education, NSF, and the Commission on Human Resources (CHR). These new data have led to revised estimates and projections which provide an outlook only slightly altered from that reported last year. The revised and updated information is presented in Table 2.2, the highlights of which are the following:

- Ph.D. production in the basic biomedical sciences dropped 4.3 percent from 1976 to 1977 (3,371 to

TABLE 2.1 Assessment of the Current Market for Biomedical Scientists--Department Survey and NIH/Westat Survey Results[a]

	Current Market for Recent Ph.D.'s				Current Market for Postdoctorals (Ph.D.'s)			
		Department Survey (%)				Department Survey (%)		
Fields	NIH/Westat	Shortage	Balance	Surplus	NIH/Westat	Shortage	Balance	Surplus
Anatomy	Shortage	60.6	32.2	6.7	Shortage	73.8	20.0	6.2
Biochemistry	Shortage	16.4	36.6	47.0	Shortage	11.7	35.3	52.9
Biology	Shortage	16.5	37.4	46.2	Shortage	18.3	40.8	40.8
Microbiology	Shortage	28.6	40.8	30.6	Shortage	22.8	48.2	28.9
Pharmacology	Shortage	51.3	35.5	12.9	Shortage	57.8	25.5	16.7
Physiology	Shortage	11.5	42.5	46.0	Shortage	15.3	43.9	40.8
Zoology	Surplus	19.0	27.6	53.5	Shortage	24.2	36.4	39.4
All fields	Shortage	36.8	36.5	26.8	Shortage	36.2	35.3	28.6

[a] The two surveys from which these results were derived were taken at different times (1975 for NIH, 1977 for department chairmen), which may account for some of the differences.

SOURCES: NIH (1977a), Appendixes E12 and E13.

TABLE 2.2 Current Trends in Supply/Demand Indicators for Biomedical Science Ph.D.'s

	1972	1975	1976	1977	Average Annual Growth Rate	Average Annual Change
					(1972-77)	*(1972-77)*
Supply indicators:						
Ph.D. production	3,176	3,286	3,371	3,225	0.3%	10
Postdoctoral appts.[a]	3,529	5,345	5,844	6,341	12.4%	562
Demand indicators:						
National expenditures for health-related R and D (1967 $)	$2.66 bil.	$2.95 bil.	$2.90 bil.	$2.93 bil.	2.0%	$54 mil.
					(1972-76)	*(1972-76)*
Life science R and D expenditures in colleges and universities (1967 $)	$1.04 bil.	$1.21 bil.	$1.22 bil.	NA	4.1%	$45 mil.
					(1972-77)	*(1972-77)*
NIH research grant expenditures (1967 $)	$613 mil.	$712 mil.	$874 mil.	$744 mil.	3.9%	$26 mil.
Labor Force:[a]						
Ph.D.'s employed in biomedical fields:					*(1972-77)*	*(1972-77)*
Total	39,931	50,584	53,089	55,594	6.8%	3,133
Academic (excl. postdocs.)	23,087	28,582	29,790	30,998	6.1%	1,582
Business	5,277	7,579	7,716	7,854	8.3%	515
Government	4,235	5,083	5,135	5,186	4.2%	192
Other (incl. postdocs.)	7,076	8,812	9,788	10,763	8.7%	737
Unemployed and seeking	264	528	660	793	24.6%	106
Biomedical enrollments:					*(1972-76)*	*(1972-76)*
First year graduate	16,027	18,876	18,823	NA	4.1%	699
Total graduate	33,508	38,314	39,322	NA	4.1%	1,454
Medical and dental schools	60,955	74,220	77,011	NA	6.0%	4,014
Estimated undergraduate[b]	343,587	428,443	463,574	NA	7.8%	29,997
Total biomedical graduate and undergraduate enrollment	438,050	540,977	579,907	NA	7.3%	35,464

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[a] Labor force and postdoctoral estimates have been revised from those shown in the Committee's 1977 report.

[b] Estimated by the formula $U_i = (A_{i+2}/B_{i+2})C_i$ where U_i = biomedical science undergraduate enrollments in year i; A_{i+2} = biomedical B.A. degrees granted in year i+2, excluding health profession B.A.'s. B_{i+2} = total B.A. degrees granted in year i+2; C_i = total undergraduate enrollments in year i. These estimates are considerably revised from those published in the Committee's 1977 report. The difference results from the exclusion of health profession B.A.'s from A_{i+2} above.

SOURCES: NRC (1973-77), NSF (1960-77), U.S. Office of Education (1959-77), NIH (1966-78).

3,225) compared to a 2.7 percent decline in all science fields. From 1971 to 1977, there has been very little change in the annual number of Ph.D.'s awarded in the basic biomedical sciences. This is similar to the general trend in annual Ph.D. production in all science fields where there has been a slight decline of 1 percent per year from 1971 to 1977 after more than two decades of practically uninterrupted growth.

- The postdoctoral pool continues to expand at a rapid pace. In 1977 there were more than 6,300 postdoctorals in the biomedical sciences, up from 5,844 in 1976, thus continuing the growth of the postdoctoral pool noted in last year's report at an annual rate of more than 12 percent.

- Estimated undergraduate enrollment in the basic biomedical sciences continues to grow at more than 7 percent per year. Graduate enrollments in these fields are growing at about one-half the rate of undergraduate enrollments. Medical and dental school enrollments grew less rapidly in 1976 but still accounted for more than 71,000 students compared with 74,000 in 1975. The net result of the above growth patterns is that total undergraduate and graduate enrollments in the biomedical sciences continue to grow at a substantial rate of almost 7 percent per year.

- Real R and D expenditures in the life sciences in colleges and universities showed almost no change from 1975 to 1976. The growth rate in these real R and D expenditures over the 1971-76 period has been only 3.2 percent per year.

- The total labor force of Ph.D.'s employed in basic biomedical fields has grown almost 7 percent per year from 1972-77. Growth in the academic sector is somewhat lower, about 6 percent per year, while growth in the business and industry sector is somewhat higher at more than 8 percent per year.

The Committee's projections of academic demand for biomedical Ph.D.'s have been revised in accordance with both this new information and a refinement in the estimating procedures. As before, these projections are based on a relationship between the Ph.D. faculty/student ratio (F/S) and R and D expenditures in colleges and universities. (An analogous model is used for the clinical sciences in Chapter 4.) The new data and revised estimating procedures result in projections of academic demand for biomedical Ph.D.'s that are slightly higher than those of last year. This is primarily because last year's estimates of the number of Ph.D.'s employed in biomedical fields have been revised upward, while the estimated undergraduate enrollment in these fields has been revised downward due to the elimination of enrollments in nursing, pharmacy, laboratory technology, and other health professional fields (see footnote to Table 2.2). The decision to eliminate these fields from this year's estimate of biomedical enrollment is based on two considerations: 1) these fields do not contribute very heavily to the demand for faculty in the basic biomedical fields and 2) the rapid enrollment growth in these fields in recent years would distort the F/S ratio for the basic biomedical sciences. These changes have the effect of raising the F/S ratio by about 45 percent over last year's estimates. Thus, in this year's estimates, each unit of enrollment has a greater impact on the demand for faculty.

Using the new estimating procedure, the data for 1962-76 indicate that the F/S ratio grew quite rapidly during the 1960's, along with R and D expenditures, but appears to have stabilized near the 0.05 level during the 1970's. This suggests that the relationship between the F/S ratio and R and D expenditures is in the form of an S-shaped curve typical of many growth processes. A growth curve[1] (Figure 2.1) fits the data slightly better than a straight line and, therefore, has been used to make projections of demand for biomedical Ph.D. faculty through 1983 under various assumptions about future patterns of R and D expenditures and biomedical science enrollments. These assumptions are presented in Table 2.3 and Figure 2.2.

From 1961 to 1975, graduate and undergraduate bioscience enrollments grew steadily at almost 7 percent per year, slightly faster than the 6 percent rate for total enrollments in colleges and universities during this period. But the demographic patterns suggest that college and university enrollments will level off and possibly decline in the 1980's. The children born in the post war "baby boom" years between 1947 and 1957 are now passing through college age and some observers feel that enrollments will have peaked by 1982 (Cartter, 1976, Keyfitz, 1978). The Committee's projections of bioscience enrollments to 1983 reflect this view, ranging from a zero growth projection on the low side to a five percent annual growth rate projection on the high side. The most likely growth rate foreseen by the Committee is about two percent per year from 1976 to 1983.

Life science R and D expenditures in colleges and universities also have been projected forward under high-, middle-, and low-growth assumptions. The middle or likely growth assumption for R and D expenditures is based on an extrapolation of the slower rate of growth in R and D that has occurred since 1968. High- and low-growth assumptions represent variations from this trend, based on possible changes in federal support for R and D.

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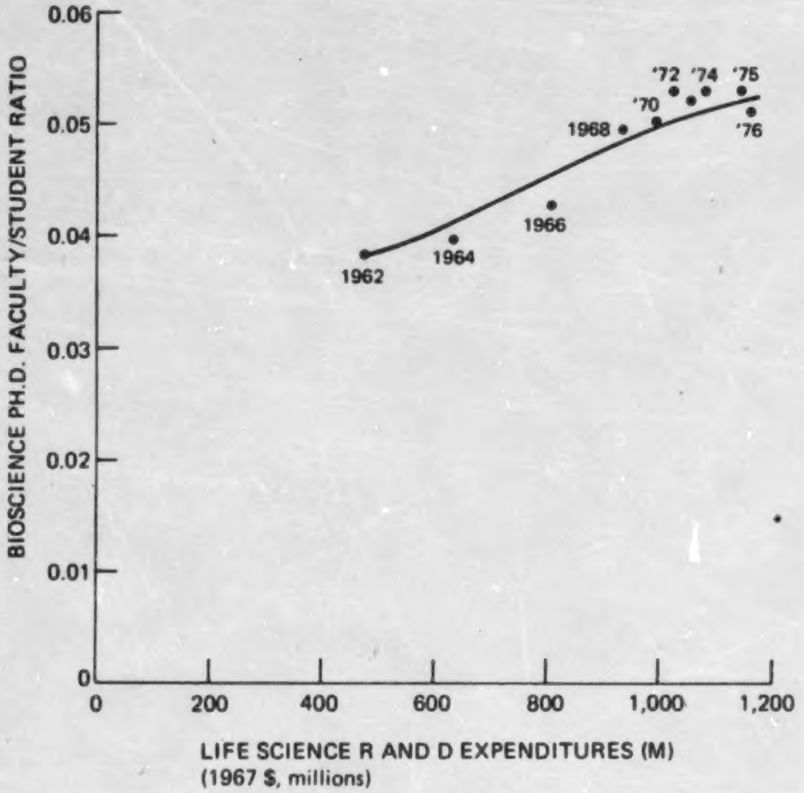
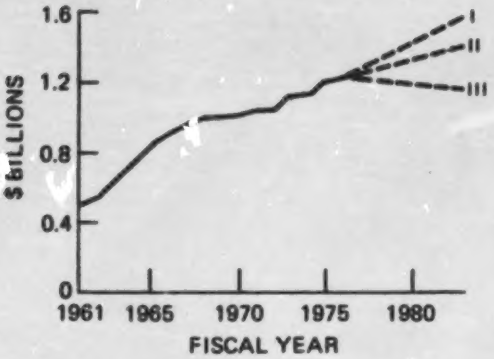
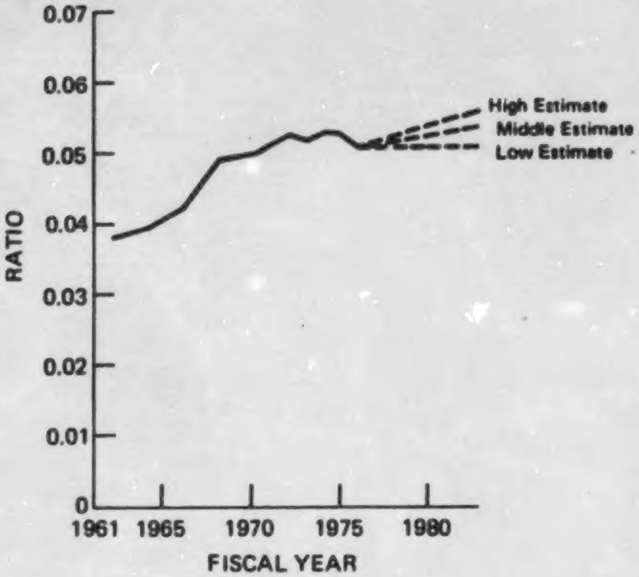


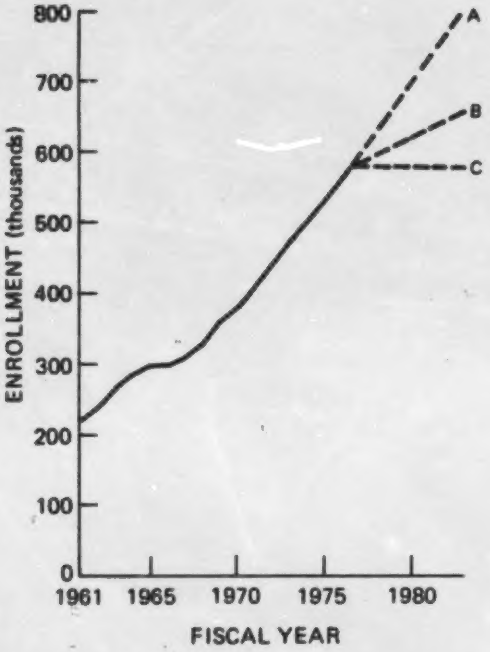
FIGURE 2.1 Ph.D. faculty/student ratio in the bioscience fields as a function of life science R and D expenditures in colleges and universities, 1962-76. M is a weighted average of the last three years of R and D expenditures, i.e., $M = \frac{1}{4}(R_t + R_{t-1} + 2R_{t-2})$. Ph.D. faculty excludes postdoctoral appointees. Solid line represents the estimated growth curve (see note 1 to this chapter).



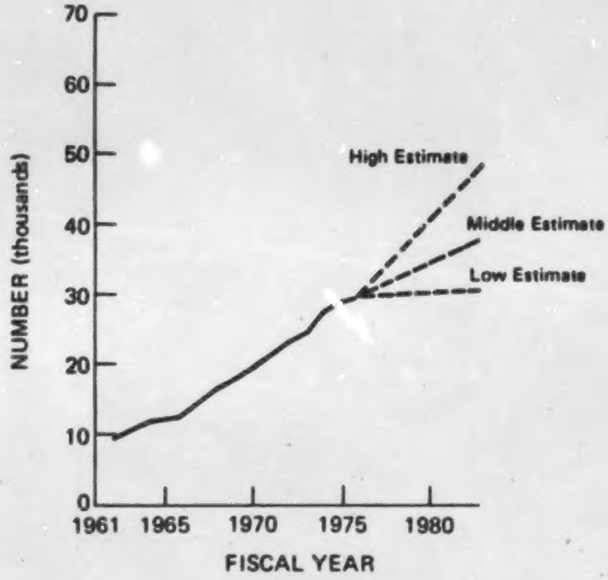
(a) Life Science R and D in Colleges and Universities (1967 $)



(b) Biomedical Ph.D. Faculty/Student Ratio



(c) Total Biomedical Graduate and Undergraduate Enrollment



(d) Biomedical Ph.D.'s Employed in Colleges and Universities (excludes postdocs.)

FIGURE 2.2 Biomedical enrollment, R and D expenditures, and academic employment, 1961-76, with projections to 1983. Based on data from NRC (1973-77), NSF (1956-70, 1977), and U.S. Office of Education (1959-77).

The nine cells in Table 2.3 thus represent various combinations of R and D and enrollment projections that encompass the range of possibilities the Committee considers likely based on trends since 1961 and the analyses it has reviewed. Under the combination of high-demand assumptions (I-A of Table 2.3), which the Committee believes to have a low probability of occurrence, demand for biomedical Ph.D. faculty (excluding postdoctorals) is expected to be about 2,800 per year for both expansion and replacement needs. This level would probably be enough to absorb all new biomedical Ph.D.'s seeking academic positions and would also reduce the postdoctoral pool.

Under the combination of low-demand assumptions (III-C), which the Committee also believes to be unlikely, less than 500 academic positions would become available annually. Clearly, this would create a much worse market for biomedical Ph.D.'s than currently exists.

Under the middle-demand and most probable set of assumptions (II-B), demand for faculty is expected to be about 1,400 positions per year. This is somewhat less than the almost 1,600 biomedical Ph.D.'s that have been added annually to college and university faculties over the 1972-77 period (Table 2.2).

Estimates of faculty and graduate student growth between 1976 and 1981 derived from the Committee's Department Survey indicate a decrease in the rate of growth from the first half of the decade and thus tend to confirm the Committee's projections. Faculty size was projected by departments to grow at an average annual rate of 2 percent with an additional 1 percent growth due to retirement (Appendix E5). This compares to the 6 percent growth from 1972 to 1976 (Table 2.2). Predoctoral enrollments were projected by departments to grow at a 2 percent annual rate to 1981 (Appendix E6), down from a 4 percent growth rate in the most recent period. If acted upon, these perceptions may be translated into a more conservative departmental growth in the future.

The question has arisen as to whether industry can absorb the anticipated surplus of biomedical doctorates. During the past few years, almost 12 percent of each year's new biomedical doctorates have gone to work in the industrial sector (NRC, 1975-77: 1977 report, p. 39). The Committee believes that this proportion is likely to increase somewhat given the impact of recent federal health-related regulatory legislation. (See the section below on priority fields for research training for a discussion of the impact of recent federal legislation.) In the pharmaceutical industry, where over one-third of the new biomedical Ph.D.'s in industry are employed, a modest increase of perhaps 2 or 3 percent annual growth of doctoral researchers could be anticipated in the near future, according to some senior research executives.

Employment of biomedical Ph.D's in federal, state, and local governments accounts for only about 10 percent of the biomedical Ph.D. labor force, somewhat less than the business sector. Furthermore, employment in the government sector has shown the

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TABLE 2.3 Projected Growth in Biomedical Science Ph.D. Faculty, 1976-83, Based on Projections of Enrollment and R and D Expenditures

Assumptions about Graduate and Undergraduate Enrollments in the Biomedical Sciences and Medical and Dental Schools		Assumptions about Real R and D Expenditures in the Life Sciences in Colleges and Universities: I Will grow at 4%/yr. 1983 value = $1.61 billion	II Will grow at 2%/yr. 1983 value = $1.40 billion	III Will decline by 1%/yr to about $1.1 billion in 1983
A. Will grow at 5%/yr to 816,000 by 1983	Expected size of biomedical faculty (F) in 1983	45,849	44,484	42,186
	Annual growth rate of F, 1976-83	6.3%	5.9%	5.1%
	Average annual increment due to faculty expansion	2,291	2,096	1,768
	Average annual replacement needs due to death and retirement[a]	492	483	468
	Expected average annual increment in biomedical Ph.D. faculty	2,783	2,579	2,236
B. Will grow at 2%/yr reaching 666,000 by 1983	Expected size of biomedical faculty (F) in 1983	37,429	36,315	34,438
	Annual growth rate of F, 1976-83	3.3%	2.9%	2.1%
	Average annual increment due to faculty expansion	1,088	929	661
	Average annual replacement needs due to death and retirement[a]	437	430	418
	Expected average annual increment in biomedical Ph.D. faculty	1,525	1,359	1,079
C. Essentially no growth from 1976 to 1983, 1983 value = 580,000	Expected size of biomedical faculty (F) in 1983	32,584	31,614	29,981
	Annual growth rate of F, 1976-83	1.3%	0.8%	0.1%
	Average annual increment due to faculty expansion	346	257	24
	Average annual replacement needs due to death and retirement[a]	406	399	387
	Expected average annual increment in biomedical Ph.D. faculty	802	657	413

[a] Based on an estimated replacement rate of 1.3% annually due to death and retirement. See Allan Cartter (1976, p. 121).

lowest growth rate of all sectors over the past years. The prospects for a significant expansion of the government sector are not encouraging.

In summary, the most likely expectation is that academic positions will continue to become available in the next few years, but the increase will be at a rate somewhat reduced from that which has occurred over the past five years. Since 1972, business and industry opportunities for biomedical science Ph.D.'s have been expanding at about 500 per year, and government employment has provided an additional 200 jobs annually. These trends are expected to continue. On the other hand, during the same 1972-77 period, while production of biomedical science Ph.D.'s has held steady at about the 3,200 level, the postdoctoral pool has been, and is still, growing at an average rate of about 560 per year.

From these observations it would appear that a reduction of about 500-600 biomedical science Ph.D.'s per year is needed to prevent a further build-up in the postdoctoral pool and to stabilize the system over the next few years.

The findings shown here must be considered somewhat tentative due to the lack of complete data in some cases and by the considerable amount of estimation required in this analysis. Yet despite the rather extensive revisions that have been made to last year's estimates, the results have changed very little. The 1978 outlook for biomedical science Ph.D.'s still indicates the likelihood of a more than adequate supply; however, the slight drop of about 150 biomedical Ph.D.'s awarded in 1977, although difficult to evaluate, could be a signal that the system is beginning to make the necessary adjustment toward equilibrium (Table 2.2).

IMPACT OF LOST TRAINING GRANT SUPPORT

It is reasonable to expect that a reduction in training support would leave an impact upon both full-time enrollments and training program activities in biomedical departments, especially in those that depend heavily upon federal funds to sustain their graduate programs. The Committee's survey of biomedical departments[2] does indeed show some impact, but the pattern of effects is far from simple among the 180 departments reporting losses in traineeships between Fall 1972 and 1975. The following discussion reflects the complex effects on full-time enrollments, program activities, and overall training quality.

Impact on Enrollments

Those departments losing traineeships experienced a 35 percent loss of this support, a loss which represented 17 percent of their 1972 full-time enrollments. Of the 180 departments reporting losses in traineeships, 37 lost them entirely by 1975 (unpublished tabulations from the Department Survey data file). Responses to the loss of traineeships were quite mixed. Some departments (approximately one-third) were able to overcome this loss through increases in one or more of the following sources: federal research assistantships, institution/state funding, or personal resources (Appendix E20). As a result, enrollments in these departments rose 19 percent during the 1973-76 period. On the other hand, the remaining two-thirds of the departments were unable to compensate fully for their traineeship losses, with the result that their enrollments declined 8 percent in this period.

The overall result was that all departments losing traineeships experienced a 3 percent increase in enrollments (Appendix E19.2). This compares to a 15 percent increase in graduate enrollments in all biomedical departments. Thus, the loss of traineeships appears to have dampened the general upward trend in enrollments.

This variegated response by departments to the loss of traineeships is difficult to explain. One would expect an impact on enrollments given the heavy reliance of training grant departments on federal support and their strong inclination to assure full-time study through stipend support. In departments with training grants in 1976, 45 percent of the full-time graduate students were dependent mainly on federal funds compared to 17 percent in departments without training grants (Appendix E19.3).

Departments with training grants also reported that the availability of federal support was the most significant factor considered in controlling admissions levels (Appendix E9). These departments assured support for a higher percentage of their students than nontraining grant departments (81 percent to 71 percent) and for a longer period of time (4.1 mean years to 3.8 years) (Appendix E10). This high level of support has enabled these departments to restrict nonacademic employment (53 percent of training grant departments have this restriction compared to 32 percent of nontraining grant departments) (Appendix E11). Such prohibitions tend to shorten the training period and allow the trainee to devote full attention to course and laboratory work.

There are certainly local as well as systemic factors involved both in the decisions of departments to attempt to compensate for their lost support and in their ability to recoup their losses. Departments losing enrollments indicated by a wide margin that the nonavailability elsewhere of alternative sources of stipend support was the primary reason for their enrollment loss (Appendix E21). On the other hand, departments showing gains in enrollments in the face of traineeship cutbacks indicated not only an ability to attract replacement stipend support but also to increase their number of self-supported students (Appendix E22). In the enrollment increase group, it was departments with high ratings, those in privately controlled institutions, and those in medical schools that were successful in obtaining funds from alternative sources, while those with lesser ratings, in publicly controlled institutions, and in graduate schools indicated that self-supported students were the primary compensatory mechanism.[3]

Impact on Program Activities

The loss of training grant support also appears to have had an impact on program activities. Department evaluations of the current (as of 1976) impact of lost institutional support from training grants indicate that support for student research (e.g., research equipment, supplies, computer time), program support staff, and student participation in professional meetings were the first activities adversely affected by cutbacks. Seventy percent of the departments said these activities had been moderately or severely curtailed (Appendix E23). In addition, when department chairpersons were asked to assess the probable impact of a total phaseout of training grants, they indicated that special seminars and interdisciplinary training would be the last to go. It appears that departments consider special seminars and interdisciplinary training to be the most essential activities supported by their training grants or perhaps the ones least replaceable by other resources.

Informal site visits conducted by the panel confirm and amplify the results from the Department Survey. Departments experiencing significant losses in traineeships were resourceful in their attempts to recoup their losses through alternative sources of stipend support. While there was some constructive reorganization attributable to belt tightening, a number of departments did encounter problems resulting from cutbacks in training grants that were substantial enough to warrant concern. Departments at two high-quality private institutions appeared to be operating at a minimal training capacity as a result of their loss of traineeships. Since alternative sources of stipend support, both internal and external to the university, are apparently exhausted, these departments felt that further reductions in federal or other stipend support would reduce the number of students below the level critical for a viable research training program. Such a condition would leave them the undesirable choice of either cutting back faculty or taking on the characteristics of a research institute, which does little in the way of training predoctoral students. In either case, the special linkage that exists at a university between a dynamic program of graduate training and ongoing faculty research projects would be greatly weakened to the detriment of both.

Impact on Training Quality

The Committee has expressed concern in each of its reports that drastic cutbacks in federal training support could have an adverse effect on the overall quality of research training. The Committee has thus been caught on the horns of a dilemma: While wishing to reduce overall bioscience enrollments in light of a projected oversupply, it does not believe that the major burden of achieving this goal should be disproportionately borne by the best training programs.

This possibility exists because the merit basis of funding federal training, fellowship, and research grant support has led to a concentration of federal graduate student support in top quality departments. Thus, basic biomedical science departments with high peer ratings of quality are almost four times as likely to have training grants as lesser and nonrated departments (Appendix E17).

Cutbacks in predoctoral traineeships will thus primarily affect the programs of established training quality. As demonstrated above, however, the impact has been quite diverse. Furthermore, while enrollments have clearly been dampened compared to other departments, severe contractions have in general not occurred. Thus, to date the Committee believes that reductions in traineeships have, with individual exceptions, not resulted in a serious diminution in the training capacity of high-quality departments. The Committee cautions against extrapolating this response to possible future cutbacks, since the long-term impact of these and more severe reductions is unknown.

The concentration of training grant support in high-quality departments also affects the program benefits that redound to recipient departments. As discussed in greater detail earlier (see Training Grants and the Quality of Training in Chapter 1), the training grant continues to be regarded as by far the superior mechanism of support because of the breadth and flexibility of the training experience afforded by its program support component. Departments interviewed on site visits consistently reiterated this viewpoint. Departments viewed teaching and research assistantships as useful complements to the core training support but not as mechanisms of support that can be relied upon for ensuring quality.

In summary, while the Committee considers an overall decline in graduate enrollments to be desirable, it is concerned that the reduction of training grants not be considered the only answer to the problem of oversupply. More complex effects need to be taken into account. For example, as discussed in Chapter 1, training reductions could have a long-term impact on the quality of biomedical research training programs.

PRIORITY FIELDS FOR RESEARCH TRAINING

In the NRSA legislation, Congress asked that a determination be made of the fields in which additional biomedical research personnel are needed. During the current year the Committee and its advisory Panel on Basic Biomedical Sciences have devoted much attention to the issue of the identification of priority areas for research training. The Committee's previously reported views on field specification were reinforced by visits by panel members to professional societies and NIH advisory and review committees which, uniformly, exhibited little enthusiasm for highly specified training programs at either the predoctoral or postdoctoral levels.

As one exception at the predoctoral level, the Committee this year identifies the field of toxicology as needing some encouragement and special attention. This need is discussed in a section below and a specific recommendation is provided in a subsequent section.

In its 1977 report, the Committee noted that employment and utilization characteristics differed by field. These differences, although not large, become more convincing as additional data are examined. The fields of biochemistry, biophysics, genetics, physiology, and biology/ecology showed somewhat worse than average employment opportunities, whereas animal sciences, environmental health and toxicology, epidemiology, and pathology are fields with better than average employment opportunities.

These findings from last year's Survey of Recent Doctorate Recipients were generally confirmed by department perceptions of the labor market as reflected in the Department Survey (Appendix E12). Nevertheless, the Committee believes it would be unwise to single out the first set of fields for reductions, given the considerable mobility in the basic biomedical sciences, and continues to believe that graduate training should be sufficiently broad to enable young scientists to continue to switch into fields of need.

With regard to postdoctoral training priorities, this year the Committee considered the question: Is the present training support mechanism sufficiently flexible to facilitate scientific growth in new fields? The Committee found broad agreement that, in general, NIH training programs do facilitate the emergence of new fields of research. Young scientists in the seminal training phases of their careers are quick to be attracted to promising new fields and are then able to plan their research careers accordingly. Individual awards facilitate such actions. With a large and varied program of postdoctoral support by NIH, this mobility is greatly enhanced. Peer review of fellowships and training grants helps to keep the training programs and the research projects on which young scientists work timely.

In reviewing fields possibly deserving special attention, the Committee reconfirmed specific training needs in the previously cited fields of biomathematics/biostatistics and epidemiology. In addition, the rationale for greater emphasis on postdoctoral training in toxicology is presented below, and a specific recommendation given for this field in a later section.

Biomathematics/Biostatistics and Epidemiology

Citing results from the Survey of Recent Doctorate Recipients, the Committee noted in last year's report that the fields of biomathematics/biostatistics and epidemiology tend to attract many persons from outside the biomedical sciences (e.g., statistics). As a result, these fields, in relation to other biomedical fields, are deficient in the number of practitioners who have had formal training through the Ph.D. level in the basic biomedical sciences. There exists, therefore, the important task of providing such individuals with fundamental biological training.

In the field of epidemiology, there is demand not only for epidemiologists with sound training in the basic sciences (Ph.D.'s), but also for epidemiologists with M.D. and other health professional degrees. As was pointed out at the public meeting, epidemiologists traditionally have been recruited from among physicians. In recent years, however, relatively few physicians have been attracted to this field because of the lower income associated with nonclinical biomedical fields, the additional education required beyond clinical training, and the absence of adequate traineeship support.

Examples of areas in which health professionals are needed are the design and direction of trials of diagnostic and therapeutic techniques for clinical use, such as mammography and the treatment of high blood pressure; conducting research on environmental and other disease control measures; studying, in conjunction with behavioral scientists, the natural history of disease including the role of behavior; and, in the area of psychiatric epidemiology, developing diagnostic questions, establishing the validity of diagnostic decisions, and developing criteria for distinguishing mental from physical symptoms.

A specific example of current interest that demonstrates the type of study where epidemiologists with health professional degrees are required is that of the exposure in 1973 and 1974 of more than 10,000 Michigan farm residents to polybrominated biphenyls (PBB) as the result of an error whereby this material accidently was added to cattle feed on Michigan farms. To determine whether or not exposure to PBB had caused illness in Michigan residents, three groups of people were studied using questionnaire and interview techniques and blood analysis of PBB levels. Later, studies of lymphocyte dysfunction were also carried out in animals and humans. Attempts were made to correlate the findings with the degree to which the individuals had been exposed to PBB. Studies such as this require the involvement of both clinically trained and nonclinical epidemiologists.

In summary, it is important to the future of the discipline to have broadly trained epidemiologists from both clinical and nonclinical backgrounds.

In the case of individuals with health professional degrees, the research training need generally is the mirror image of that discussed above for Ph.D.'s, namely, to acquire the necessary mathematical skills through specialized training programs.

Toxicology

Historically, the science of toxicology developed from a need to know more about the causes and effects of acute poisonings of various kinds. Today, however, the need has shifted to understanding better the results when humans have been exposed for long periods of time to very small, often trace, amounts of a whole spectrum of man-made chemicals and other substances that now permeate our environment.

In recent years a broad array of federal regulatory legislation has been enacted in response to the public's heightened concern about the potential health problems created by these substances. This legislation has been directed primarily toward the control of insecticides and pesticides, food additives, air and water pollutants, radiological hazards, new drugs, medical devices, and toxic chemicals.

Traditionally, this field has been a neglected area from the research standpoint, and even today there are relatively few individuals devoting full time to fundamental research in toxicology. A heavy demand has been placed upon industry to conduct certain types of testing. Such testing presupposes that the science base exists, that the investigative methods have been developed and tested, and that theories and hypotheses derived from studies with animals or lower organisms can be translated into meaningful terms for humans. Unfortunately, much of the basic research that is needed to provide the necessary infrastructure has not been done. Thus, there is a need for additional research toxicologists.

In addition, there is a concomitant demand for midlevel professional personnel who have had some advanced training and for an even larger number of skilled technicians to conduct the actual tests and collect the necessary data on the characteristics of specific substances. Neither of these categories of personnel lies within the purview of the Committee's responsibility.

A workshop held last year, sponsored by the Environmental Protection Agency (EPA), the National Institute of Environmental Health Sciences (NIEHS), the Chemical Industry Institute of Toxicology, and The Conservation Foundation, on Training of Scientists for Future Toxic Substances Problems (The Conservation Foundation, 1978), estimated that approximately 500 senior professional research toxicologists were needed to meet the immediate needs imposed by environmental health legislation, together with an annual continuing need for another 100 to replace those senior professionals lost each year from the field of toxicology because of death and retirement.

Without endorsing these specific estimates, the Committee is in agreement with the workshop's basic conclusion that additional senior research toxicologists are needed to conduct the fundamental research that will underlie future testing procedures. Although much of the needed research will be conducted by industry, the Committee believes that the national importance of this work warrants the support of the required research training under the NRSA program.

Currently, toxicologists receive their research training in a few basic biomedical fields, primarily pharmacology, biochemistry, and pathology. The Committee believes that no critical shortages exist for research personnel in these fields and that, given field mobility in the basic biomedical sciences, the immediate needs for research scientists in toxicology can best be met with an organized toxicology postdoctoral training grant program. This program should be designed to expedite the acquisition of the knowledge and experience necessary for young doctorate recipients from the various fields of the basic biomedical sciences to do research in toxicology. It should help to ease the current research personnel shortages related to the recent legislation.

In order to ensure that the long-range needs of the field are met beyond the immediate entrance of postdoctorals, a small prototype, multidisciplinary, predoctoral training program in toxicology is also needed. Since the Committee is engaged in a continuing study, it will review the situation annually and revise its recommendations as future assessments warrant.

Formal recommendations are set forth in a later section of this chapter.

Other Fields

The Committee received evidence from several sources, including the Department Survey, that anatomy departments are often unable to find suitable applicants for available faculty positions. However, these personnel needs are more related to the teaching responsibilities of this field than to research needs, and thus not directly under the purview of this study. Most researchers in anatomy departments are from the fields of cell biology, neurobiology, or developmental biology, and the Committee has found an adequate number of personnel trained in these fields to satisfy research needs.

In the field of microbiology, the Committee has received comments that the variety of subdisciplines within microbiology have not been adequately considered and that there is evidence to substantiate the existence of overall shortages in this field. The Committee can find no evidence to support these views. The Committee believes that interfield mobility adequately fulfills the personnel needs for research training in the biosciences, including microbiology. To the extent that microbiology relates to the shortage fields identified by the Committee--epidemiology, biomathematics/biostatistics, and toxicology--the Committee believes that its recommended programs are sufficient to meet their needs. The evidence of labor market shortage is largely based on the NIH/Westat survey. As noted earlier in this chapter (see Assessment of the Current Market), the Committee does not agree with this interpretation of the findings from that survey. The perceptions of microbiology department chairpersons (as reported in the Committee's Department Survey) do not support an appraisal of general shortage (Appendixes E12 and E13).

RECOMMENDATIONS

Predoctoral Training Levels

In its previous report the Committee discussed the high mobility among fields of the basic biomedical sciences as revealed in the Survey of Recent Doctorate Recipients. Based in part on these results, the Committee concluded that specific numerical recommendations should not be made by individual field for predoctoral research training.

During the past year the Committee has examined recent information concerning future employment opportunities for biomedical research personnel and found no reason to change the recommendations for predoctoral training support it made in the 1977 report. In light of the discussion in the earlier sections of this chapter, the Committee believes that its previous recommendations of a 30 percent reduction during the past 2 years in federal support for predoctoral training are well justified (NRC, 1975-77: 1976 report, p.9, and 1977 report, p. 67). The Committee is hesitant, however, to recommend a further reduction until it has had adequate opportunity to evaluate the impact of these past recommendations, since further reductions could inadvertently reduce the effectiveness of the training programs and thus the future quality of the national endeavor in biomedical research.

Recommendation. The number of predoctorals supported in the basic biomedical sciences should be maintained at a level of 4,250 for FY 1980 and until such time as new information indicates to the Committee that a change should be made.

Postdoctoral Training Levels

The Committee previously has recommended that 3,200 postdoctoral awards in the basic biomedical sciences be considered at the present time as the steady-state level. As shown in Table 2.4, the number of basic biomedical postdoctoral awards listed by the agencies for 1977 is significantly below the 1975 and 1976 levels. The number of postdoctoral training positions made available by the agencies in FY 1977 fell short of this recommended level by about 15 percent (Table 1.1). Most probably, this was the result of budgetary limitations, since the actual amount appropriated for training was over 12 percent less than the amount the Committee estimated would be required to sustain its recommendations. As noted in the Committee's 1976 report (NRC, 1975-77), the growing number of postdoctoral appointees in the basic biomedical sciences increasingly have drawn support from research grants and nonfederal sources. In 1976, these sources supported more than 60 percent of the postdoctoral appointees in the biological sciences, while federal fellowships and training grants supported just under 40 percent (NSF, 1973-77).

Because of the special but limited need for toxicologists that now exists (see separate section), the Committee is recommending that NIH earmark 200 of these postdoctoral awards for individuals who wish to undertake this advanced training in toxicology or basic research related to toxicology and environmental health.

This level of support will approximately double the effort NIH now provides in this field. The Committee in the future will monitor the supply/demand balance for this field and revise its recommendation in the light of these assessments.

Recommendation. The Committee recommends that for FY 1980-82, 3,200 postdoctorals continue to be supported annually. The Committee further recommends that of this number approximately 200 postdoctoral awards each year be in the field of toxicology or research training related to toxicology. (See

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TABLE 2.4 Panel Recommendations for NIH and ADAMHA Predoctoral and Postdoctoral Traineeship and Fellowship Awards in the Basic Biomedical Sciences

Agency Awards and Committee Recommendations	Fiscal Year							
	1975	1976	1977	1978	1979	1980	1981	1982
Actual awards								
Total	*9,199*	*8,216*	*6,526*					
Pre	*6,003*	*4,449*	*3,809*					
Post	*3,196*	*3,767*	*2,717*					
1976 recommendations								
Total		8,600	8,600	8,600				
Pre		5,400	5,400	5,400				
Post		3,200	3,200	3,200				
1977 recommendations								
Total					7,450	7,450	7,450	
Pre					4,250	4,250	4,250	
Post					3,200	3,200	3,200	
1978 recommendations								
Total						7,550	7,550	7,550
Pre						4,250	4,250	4,250
Post						3,300	3,300	3,300

the later section on field specification for postdoctoral training.)

Training Grants and Fellowships

The Committee reaffirms its previous recommendation on this issue:

Recommendation. The Committee recommends that institutional training grants be the primary mechanism for NRSA support of predoctoral students in the basic biomedical sciences. Support of postdoctoral training, on the other hand, should utilize primarily the mechanism of individual fellowships.

At the postdoctoral level in the basic biomedical sciences for Ph.D. degree holders, the Committee has recommended and continues to believe that support should generally be on an individual basis through fellowships. Although the latter policy represents a modification in the current NIH practice of utilizing both mechanisms, the Committee is convinced that, with some exceptions, organized training programs are not needed since most postdoctoral training is focused within the individual research group. As illustrated in Table 2.5, some change in this direction is occurring. An example of an exception to this rule is the recommendation by the Committee for a postdoctoral training grant program in the field of toxicology, where, the Committee believes, organized programs would be more effective for providing the required training and skills to scientists from other basic biomedical fields.

Priority Fields and Announcement Areas

Predoctoral Training. The Committee reaffirms its past recommendations that 1) unless otherwise noted, there be no predoctoral field specification except for review and administrative purposes; 2) all fields appropriate to the mission of NIH receive equal consideration; and 3) awards be made on the basis of merit as determined by the peer review system.

As discussed earlier in this chapter in the section on priority fields, the three fields of epidemiology, biomathematics/-biostatistics, and toxicology need special attention and therefore should be specified in the official

TABLE 2.5 NIH and ADAMHA Postdoctoral Traineeship and Fellowship Awards, 1975-77, in the Basic Biomedical Sciences

	Fiscal Year		
	1975	1976	1977
TOTAL	3,196	3,767	2,717
Postdoctoral Traineeships	1,781	2,076	1,260
Postdoctoral Fellowships	1,415	1,691	1,457

announcements concerning support for predoctoral research training.

Recommendation. The Committee recommends that 1) predoctoral training fields not be specified in agency announcements for reasons other than for review and administrative purposes except for epidemiology, biomathematics/biostatistics, and toxicology which are viewed by the Committee as priority areas for predoctoral training; 2) NIH provide support for the establishment of prototype, multidisciplinary, predoctoral training grant programs in toxicology and related research areas in order to meet the long-term needs in this field for broadly trained researchers.

Postdoctoral Training. During the past year and particularly at its public meeting, the Committee's attention has been directed to the needs of certain fields for postdoctorals and the need to emphasize some aspects of postdoctoral training within those fields. These expressed needs have been reviewed in the earlier discussion in this chapter on priority areas. Specifically, the Committee makes the following recommendation:

Recommendation. The Committee recommends that 1) in the field of biomathematics/biostatistics, encouragement be given to establishing programs to provide mathematical training for doctorates from other biomedical sciences; 2) in the field of epidemiology, encouragement and emphasis be given to attracting and providing postdoctoral training for M.D.'s; and 3) increased postdoctoral support be provided to the field of toxicology. (See the previous recommendation in the section on postdoctoral training levels.)

Coordination of NIH Support for Predoctoral Training

In its report for 1977, and again this year, the Committee has stressed its belief that research training at the predoctoral level should be broadly based and not overly specified or directed toward particular applications (e.g., specific diseases). This view has been stated again as part 1 of a recommendation given in the previous section.

With this in mind, it is not surprising that the Committee has had some difficulty understanding the philosophy and scope of the predoctoral training programs and policies of NIH, particularly in view of the differing practices of the several institutes that share authorization for predoctoral training. The Committee recognizes the value of supporting research and postdoctoral training by the categorical institutes but does not believe that this pluralistic system is beneficial for predoctoral training. The Committee believes it would be inconsistent and administratively unwieldly to eliminate predoctoral field specification for the basic biomedical sciences, yet continue to have, without any overall coordination by the agency, predoctoral awards made by the various categorical institutes in accordance with their own specific missions.

This problem is particularly acute in such multidisciplinary fields as epidemiology and biostatistics. The current practice of having each institute support only the portion of each field relevant to its interest has made these specialized methods fields particularly vulnerable to inadvertent gaps in support by the agency. The Committee believes that a more comprehensive approach, entailing either a centralized administrative locus or a single coordinating unit, is needed to assure that the development of these fields proceeds in a balanced way.

Because the purpose of the predoctoral training grant program is to train the best young scientists for research careers in all fields relevant to the overall mission of NIH, the Committee believes that NIH should institute a mechanism for coordinating all of the support it provides for predoctoral training through the various institutes. Such coordination might be accomplished either through the Office of the Director or, alternatively, by concentrating the administrative responsibility for all predoctoral support within one institute. If the latter means is selected, the Committee considers the National Institute of General Medical Sciences (NIGMS), the only noncategorical institute at NIH and the one that now supports about two-thirds of all NIH-funded predoctoral training, to be the appropriate body for this responsibility. The Committee wishes to emphasize that the coordinating unit, whether within the Office of the Director, or a single institute, must assure that the separate institutes both participate fully in the decision-making process and contribute appropriately to the support required for the total program. Regardless of the means selected, the objective of this coordination is to make sure that neither undue emphasis nor gaps occur in the support of predoctoral training across the spectrum of the basic biomedical sciences.

Recommendation. The Committee recommends that NIH establish a procedure for coordinating all of its support for predoctoral training in the basic biomedical sciences. It is suggested that this might be accomplished either through the Office of the Director or by placing this administrative responsibility within

NIGMS. The purpose of such coordination is to ensure that no aspect of predoctoral training in the basic biomedical sciences, including the fields of biomathematics/biostatistics and epidemiology, is either undersupported or overemphasized.

Regardless of the administrative means selected, the funding institutes should participate fully both in providing appropriate support for the final program adopted by the agency, as well as in the decision-making process whereby this plan is established.

Multidisciplinary Training Grants

The Committee reiterates the endorsement it gave in its 1977 report to the concept of multidisciplinary training, especially at the predoctoral level, and also its position that applications for training grants should be accepted by NIH from single departments as well as from those which are multidepartmental in nature. Different structural arrangements are possible for acheiving the objective of multidisciplinary training. NIH, especially NIGMS, should not preclude considering applications solely on the basis of departmental arrangements.

Recommendation. The Committee recommends that NIH not discourage applications for predoctoral training grants from single departments, and that NIH leave to the peer review system, as part of the application review process, decisions about what departmental arrangements in each case are best.

Fellowship Applications

The Committee has been informed that NIH and ADAMHA have had difficulty in receiving an adequate number of qualified postdoctoral fellowship applications in the biomedical sciences. This poor response is believed to have been due, in part, to the discouragingly long wait required for decisions to be made on the applications as a result of the dual review process, with the consequence that applicants frequently have had to make other career decisions prior to their being notified of the action taken on their application. A related consequence has been that the shift from training grants to fellowships at the postdoctoral level has been retarded.

Recommendation. The Committee recommends that the time for reviewing postdoctoral fellowship applications be reduced by omitting the currently required review and approval by advisory councils and by whatever other means may be possible.

FOOTNOTES

1. The mathematical specification of the relationship is as follows:

$F/S = \exp[\alpha - \beta/(M-C)] + K$ where F = Ph.D.'s employed in basic biomedical science fields at colleges and universities; S = estimated graduate and undergraduate enrollment in bioscience and medical and dental schools; M = weighted average of the last three years of life science R and D expenditures in colleges and universities, i.e., $M_t = 1/4(R_t + R_{t-1} + 2R_{t-2})$, 1967 \$, millions; α, β, C, K = Constants to be determined empirically.

Fitting this curve to the data for 1962-76 gives the following estimates for the parameters:

$\alpha = -3{,}354$
$\beta = 734.0$
$C = 300$
$K = 0.037$

2. Tables from the Survey of Biomedical and Behavioral Science Departments (cited as "Department Survey") are contained in Appendix E.

3. Definitions of departmental characteristics--quality (Roose-Andersen) rating, institutional control, school type, and department age--may be found in Appendix E1.

3. BEHAVIORAL SCIENCES

INTRODUCTION

The Committee and its Panel on Behavioral Sciences have responded to the diminution of academic employment prospects for new Ph.D.'s and to developments in behavioral research by recommending that a shift to predominantly postdoctoral training be achieved by FY 1981, with the ratio of support set at 30 percent predoctoral/70 percent postdoctoral by that year.[1] The shift in training emphasis was suggested in order to promote emergence of "specialized investigators in the area of behavior and health," while maintaining support in traditional fields "important to the national mental health effort" (NRC, 1975-77: 1977 report).

For 2 years now the Committee has had the opportunity to review and discuss the responses of the scientific community to this recommended modification through statements made at the public meetings convened by the Committee in 1976 and 1977 and through individual communications. These views, together with information provided by NIH and ADAMHA regarding their actions in implementing these recommendations, have guided the Committee in its deliberations.

In its present report, the Committee reaffirms its position that a shift to predominantly postdoctoral training is appropriate and recommends that the overall ratio of 30 percent predoctoral/70 percent postdoctoral be maintained through FY 1982 (Chapter 1, Table 1.2).

Labor market analyses continue to suggest that academic employment prospects for new behavioral science Ph.D.'s depend on academic enrollment growth, given current rates of Ph.D. production and current employment conditions. For the purpose of market analysis, the behavioral sciences have been separated into clinical and nonclinical components, defined in the next section. (Training fields are defined in Appendix D3.)

In recent years the number of behavioral science Ph.D.'s employed in nonacademic sectors has increased at a faster rate than the number employed in academic settings. Indeed, findings from the 1977 NRC Survey of Biomedical and Behavioral Science Departments included in this report reveal that a majority of behavioral science department heads perceive a moderate to critical surplus of Ph.D.'s in the behavioral sciences based on recent doctoral placement experiences. These changes in the behavioral science employment pattern led the Committee to explore in more detail the data from the 1976 NRC Survey of

Biomedical and Behavioral Scientists reported last year (NRC, 1975-77: 1977 report).

In the present report the responses of the 1971-75 nonclinical behavioral science Ph.D.'s employed in nonacademic settings are compared with those of their colleagues employed in the academic sector. The findings suggest that employment in nonacademic settings does not lessen the opportunity for behavioral scientists to conduct health-related research (Tables 3.3 and 3.4). This has led the Committee to conclude that guidelines for payback should continue to be liberally applied to encourage certain types of employment in nonacademic settings for behavioral scientists having received NRSA support.

Information has been brought to the attention of the Committee that suggests that certain barriers are preventing the active recruitment of clinical psychologists, psychiatrists, and other mental health professionals to conduct mental health research. The Committee in its present report explores opportunities for predoctoral NRSA support for these personnel, the availability of suitable sites for their research training and the potential for interdisciplinary research training. The Committee concludes that an effort must be made in the coming year to more fully document the factors involved in enhancing the pool of clinicians who conduct mental health research.

This attempt to develop research training recommendations based on a description of the market outlook and perceived national research needs awaits testing, which will occur when the first class of graduate students affected by the Committee's recommendations reaches the job market in the early 1980's (Shull, 1978). However, careful continued monitoring of emerging enrollment and employment patterns suggest that no adverse effect as a result of the Committee's recommendations need occur if trends are carefully watched and proper action taken.

OUTLOOK FOR THE BEHAVIORAL SCIENCES

In its 1977 report, the Committee presented the labor market outlook for Ph.D.'s in the behavioral sciences. The outlook was based on a comparison of expected demand for Ph.D. faculty in the behavioral sciences relative to the annual number of behavioral Ph.D.'s being produced.

Last year the Committee observed that the analysis of the labor market in the behavioral fields was hindered by treating the behavioral sciences as a single entity. The Committee concluded that the separation of the behavioral sciences into clinical and nonclinical segments would be a step toward a more realistic characterization of this area and would produce a better basis for analysis.

Since the 1977 report was published, additional data have become available, and the separation into clinical and nonclinical segments has been made. The clinical fields include clinical psychology, counseling and guidance, and school psychology.[2] The remaining fields of psychology, together with anthropology, sociology, and speech and hearing sciences[3] constitute the nonclinical fields.

In separating these fields, it was hoped that a relationship between R and D expenditures and the nonclinical faculty/student ratio could be developed. While the disaggregated data still do not provide much empirical evidence of such a relationship, the analysis does appear to benefit from the separation. Among other things, the greater dependence of the nonclinical fields on academic employment is clearly revealed, confirming the tentative findings presented in the Committee's past reports (NRC, 1975-77: 1976 and 1977 reports). Table 3.1 presents the data in terms of some of the indicators the Committee has relied on to assess the labor market.

Ph.D. Production

Nonclinical. The yearly increases in 1976 and 1977 were smaller than in previous years. This is a sign that Ph.D. production for these fields may be leveling off. The 1977 level was only 1.4 percent greater than the 1976 level in contrast to the average annual increase of about 4 percent since 1971.

Clinical. Ph.D. production is also slowing down but at a lesser rate than in the nonclinical fields. The increase from 1976-77 was 3.4 percent, while the average yearly increase since 1971 has been over 8 percent.

Postdoctorals

Nonclinical. The number of postdoctoral appointments has been growing at more than 10 percent per year since 1972. As suggested in last year's report, the buildup of the postdoctoral pool may be a sign that the academic market is not absorbing new Ph.D.'s in traditional academic positions at a rate commensurate with Ph.D. production.

TABLE 3.1 Current Trends in Supply/Demand Indicators for Behavioral Science Ph.D.'s[a]

	1972	1975	1976	1977	Average Annual Growth Rate	Average Annual Change
Supply indicators:						
Nonclinical:					*(1972-77)*	*(1972-77)*
Ph.D. production	2,213	2,580	2,709	2,746	4.4%	107
Postdoctoral appts.[b]	389	515	580	644	10.6%	51
Clinical:						
Ph.D. production	902	1,118	1,262	1,305	7.7%	81
Postdoctoral appts.[b]	124	247	313	379	25.0%	51
Demand indicators:						
Behavioral sciences R and D expenditures in colleges					*(1972-76)*	*(1972-76)*
and universities (1967 $)	$99.8 mil.	$94.5 mil.	$83.0 mil.	NA	-4.5%	$-4.2 mil.
Labor force:[b]						
Ph.D.'s employed in nonclinical behavioral fields:					*(1972-77)*	*(1972-77)*
Total	18,472	23,682	25,170	26,657	7.6%	1,637
Academic (excl. postdocs.)	14,443	18,433	19,269	20,105	6.8%	1,132
Business	1,173	1,651	1,770	1,888	10.0%	143
Government	977	1,289	1,888	1,651	11.1%	135
Other (incl. self-emp. and postdocs.)	1,699	1,936	2,151	2,365	6.8%	133
Unemployed and seeking	180	373	510	648	29.2%	94
Ph.D.'s employed in clinical behavioral fields:						
Total	10,511	14,729	16,138	17,547	10.8%	1,407
Academic (excl. postdocs.)	4,159	5,064	5,248	5,432	5.5%	255
Business	1,297	2,383	2,969	3,554	22.3%	451
Government	1,135	1,222	1,313	1,405	4.4%	54
Other (incl. self-emp. and postdocs.)	3,873	5,995	6,536	7,077	12.8%	641
Unemployed and seeking	47	65	72	79	10.9%	6
Behavioral science enrollments:					*(1972-76)*	*(1972-76)*
First-year grad.	22,604	25,081	26,270	NA	3.8%	917
Est. total grad.						
nonclinical	31,033	34,368	35,385	NA	3.3%	1,088
clinical	10,852	14,669	16,411	NA	10.9%	1,390
Est. nonclinical undergrad[c]	682,002	673,197	754,138	NA	2.5%	18,034
Total nonclinical grad. and undergrad.	713,035	707,565	789,523	NA	2.6%	19,122

[a] In this table clinical behavioral fields include clinical and school psychology, counseling, and guidance; nonclinical behavioral fields include anthropology, sociology, and nonclinical psychology.

[b] Labor force and postdoctoral estimates have been revised from those shown in the Committee's 1977 report.

[c] Estimated by the formula $U_i = (A_{i+2}/B_{i+2})C_i$, where U_i = behavioral science undergraduate enrollments in year i; A_{i+2} = behavioral science baccalaureate degrees awarded in year i+2; B_{i+2} = total baccalaureate degrees awarded in year i+2; C_i = total undergraduate enrollments in year i.

SOURCE: NRC (1973-77), NSF (1960-77), U.S. Office of Education (1959-77).

Clinical. Although the number of clinical postdoctorals is quite small (about 380 in FY 1977), it has been growing at a rate of 25 percent annually since 1972. It is not clear, however, whether this represents a tightening of the market for these psychologists or a change in the role of postdoctoral training in clinical psychology.

The Committee notes, for example, that over 50 percent of the 1971-75 clinical psychology Ph.D.'s taking a postdoctoral appointment within 1 year of completing their doctorate did so for reasons other than getting research experience, switching fields or failing to gain employment (NRC, 1975-77: 1977 report, Appendix E1.2). The Commmittee will explore the role of postdoctoral training for these clinical fields in more detail in the coming year.

Academic Labor Force

Nonclinical. More than 75 percent of the nonclinical Ph.D. labor force is employed in colleges and universities. The average annual increase in faculty positions has been about 1,100 since 1972.

Clinical. Only about 30 percent of the Ph.D.'s in these fields are employed in academic settings. A greater proportion are employed in hospitals or clinics or are self-employed.

Enrollments

The separation of enrollment data into clinical and nonclinical categories has been made for the graduate level only. Enrollment within clinical fields is almost half the total for all the behavioral sciences. Both undergraduate and nonclinical graduate enrollments are increasing at a rate of 3.1 percent per year.

Projections of Academic Demand

Revised projections of academic demand have been developed this year for the nonclinical areas but not for the clinical area, since only a small fraction of clinical behavioral scientists are academically employed. The projected demand for nonclinical behavioral faculty has been based on assumptions about future enrollments and about the magnitude of faculty/student ratios. Note that the projection methodology used here must differ slightly from that used in the biomedical and clinical sciences areas. Since no significant relationship can be demonstrated between the nonclinical F/S ratio and behavioral science R and D expenditures in colleges and universities, future F/S levels must be estimated from an examination of past patterns rather than calculated from assumed R and D expenditures. The nonclinical F/S ratio has behaved in a somewhat erratic fashion over the past 15 years as shown in Figure 3.1(b). No long term trend is discernible in this pattern, but the ratio has jumped from less than 0.020 during the 1960's to higher levels in the 1970's.

As in last year's report, the Committee has made three assumptions about future enrollment and used these in combination with three assumptions about future levels of the nonclinical faculty/student ratio (Figure 3.1 and Table 3.2).

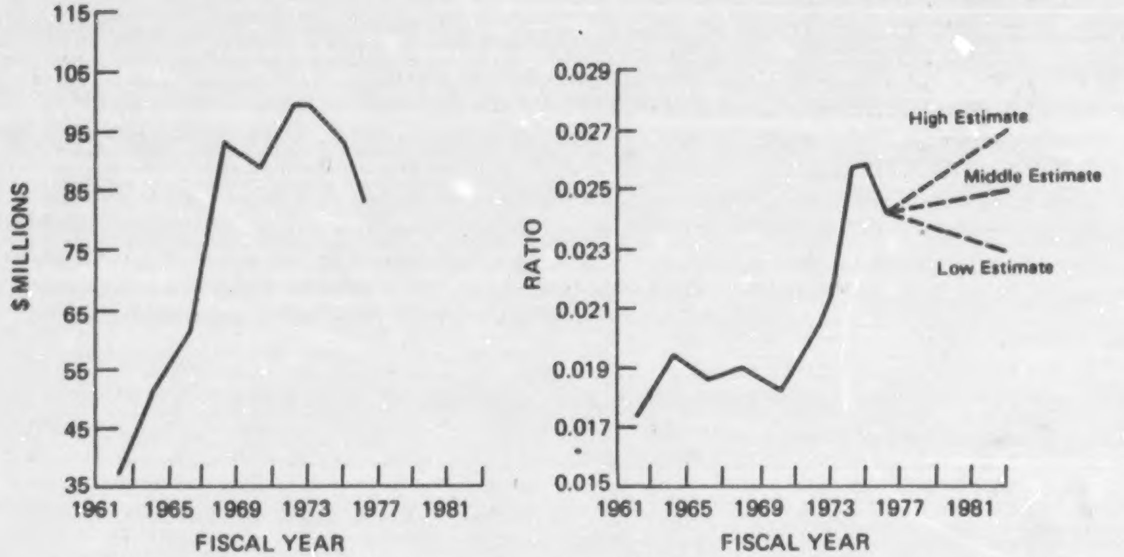
The nonclinical faculty/student ratio in 1976 was 0.024. Under the high assumption it is projected to increase to 0.027 in 1983; under the middle assumption it will increase to 0.025 in 1983; under the low assumption it will decrease to 0.023 in 1983.

Enrollments have been projected forward under an assumed high rate of 3.5 percent per year, a middle rate of 2 percent per year, and a low rate of zero growth.

The middle set of assumptions (Table 3.2 II-B) is considered to be the most likely case. Under this combination of assumptions, demand for nonclinical Ph.D. faculty in the behavioral sciences is expected to average about 760 positions annually to accommodate both expansion and replacement needs. This is approximately 370 less than the number of nonclinical Ph.D.'s that are currently being added to faculties each year. Thus, at this projected level of academic demand, Ph.D. production would have to be reduced by 300 to 400 Ph.D.'s per year to prevent further imbalances from developing if other employment in other sectors remains constant.

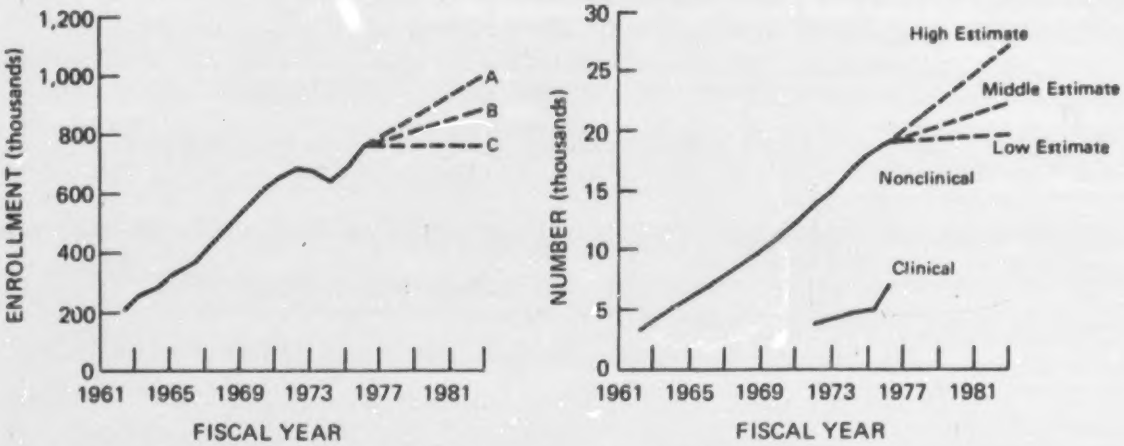
However, both the business and government sectors are expanding faster than is the academic sector and, although they employ many fewer nonclinical behavioral Ph.D.'s, their continued expansion could provide jobs for many of the Ph.D.'s not absorbed into the academic sector.[4]

On the other hand, if enrollments continue to grow at their present rate, rather than decline to 2 percent per year as expected, and if Ph.D. production stabilizes at its current level, the prospects for new Ph.D.'s would be much improved. In this case the academic market for nonclinical behavioral Ph.D.'s likely would expand just enough to accommodate practically all Ph.D.'s being produced at the current rate. But if departmental perceptions of no growth in enrollments are correct, then the annual number of Ph.D 's would have to be even more drastically curtailed to prevent near term imbalances. It is clear that



(a) Behavioral R and D in Colleges and Universities (1967 $)

(b) Nonclinical Behavioral Ph.D. Faculty/Student Ratio



(c) Total Behavioral Undergraduate and Nonclinical Graduate Enrollment

(d) Behavioral Ph.D.'s Employed in Colleges and Universities

FIGURE 3.1 Behavioral science (psychology, sociology, and anthropology) enrollment, R and D expenditures, and academic employment, 1961-76, with projections to 1983. Based on data from NRC (1973-77), NSF (1977), and U.S. Office of Education (1959-77).

TABLE 3.2 Projected Growth in Nonclinical Behavioral Ph.D. Faculty, 1976-83, Based on Projections of Enrollment and Faculty/Student Ratios

Assumptions about Behavioral Science Undergraduate and Nonclinical Graduate Enrollment		Assumptions about the Faculty/Student Ratio for Nonclinical Behavioral Ph.D.'s		
		I Will continue to grow, reaching 0.027 by 1983	II Increases slightly to 0.025 by 1983	III Declines to 0.023 by 1983
A. Will grow at 3.5%/yr, somewhat faster than present rate (about 3.1%/yr), reaching 1,004,500 students by 1983	Expected size of nonclinical behavioral science faculty (F) in 1982	27,121	25,112	23,103
	Annual growth rate in F from 1975-82	5.0%	3.9%	2.6%
	Average annual increment due to faculty expansion	1,122	835	548
	Annual replacement needs due to death and retirement[a]	302	288	275
	Expected total annual increment in nonclinical behavioral science Ph.D. faculty	1,424	1,123	823
B. Will grow at 2.0%/yr, reaching 906,900 students by 1983	Expected size of nonclinical behavioral science faculty (F) in 1982	24,487	22,673	20,859
	Annual growth rate in F from 1975-82	3.5%	2.4%	1.1%
	Average annual increment due to faculty expansion	745	486	227
	Annual replacement needs due to death and retirement[a]	284	273	261
	Expected total annual increment in nonclinical behavioral science Ph.D. faculty	1,029	759	488
C. Essentially no growth from 1976 level of 789,500 students	Expected size of nonclinical behavioral science faculty (F) in 1982	21,317	19,738	18,159
	Annual growth rate in F from 1975-82	1.5%	0.3%	-0.8%
	Average annual increment due to faculty expansion	293	67	-159
	Annual replacement needs due to death and retirement[a]	264	254	243
	Expected total annual increment in nonclinical behavioral science Ph.D. faculty	557	321	84

[a] Based on an estimated replacement rate of 1.3% annually due to death and retirement. See Cartter (1976, p. 121).

these trends in enrollments and Ph.D. production, which are important indicators of the system's movement toward or away from equilibrium, must continue to be monitored closely.

FINDINGS FROM THE SURVEY OF BEHAVIORAL SCIENCES DEPARTMENTS

Over 75 percent of the 474 behavioral science departments with doctoral programs responded to the 1977 NRC Department Survey (Appendix E). Responses were analyzed by differences among fields and by such characteristics as age of the department, quality of the department, and whether the department was located in a public or private institution or in a graduate or medical school.[5]

In contrast to the biomedical sciences, behavioral science departments rely less on federal funding for support of their full-time graduate students. Only 19 percent of the behavioral science graduate students received their primary support from the federal government in 1976 as compared to 32 percent in the basic biomedical sciences (Appendixes E19.3 and E40.3). As might be expected, however, behavioral science departments receiving federal training grant support had a higher percentage of full-time students whose primary support came from federal funds than did departments without training grants (27 percent versus 11 percent) (Appendix E40.3). Hence, changes in federal support patterns might be expected to affect enrollments in departments receiving such support.

In the sections that follow, the responses of these behavioral science departments are analyzed with respect to their perception of the labor market; the effect of the availability of predoctoral support on full-time graduate enrollments; and the impact of lost training grant support on such factors as enrollments and the training environment.

Labor Market Issues

The majority of behavioral science departments indicated that there is a surplus of doctorates in their field in the labor market (Appendix E34).

The state of the job market was reported as having a significant impact on the department's predoctoral admissions policy by 42 percent of the departments (Appendix E30). Furthermore, 64 percent of the behavioral science departments said that a future worsening market would cause them to limit enrollments (Appendix E36). However, departments generally perceived no growth in predoctoral enrollments through 1981 (Appendix E28).

There was little indication that a worsening labor market has resulted in a postdoctoral holding pattern, since only 11 percent of the departments with postdoctorals indicated that there was a lengthening of time individuals spent in postdoctoral status due to a worsening job market (Appendix E37). Departments predicted that postdoctoral levels would grow at an average annual rate of 6 percent through 1981 (Appendix E29).

Factors Influencing Predoctoral Support

The availability of predoctoral support was judged by 52 percent of behavioral science departments to be an important factor in determining admissions (Appendix E31). Departments at private institutions, those with training grants, and older departments indicated in general a greater tendency to limit admissions based on anticipated support (Appendix E31).

Most departments (78 percent) reported that they guaranteed some of their predoctoral students full tuition-stipend support. As might be expected, departments with training grants were in the best position to do this (Appendix E32).

Only 28 percent of the departments reported a policy prohibiting regular nonacademic employment for full-time students (Appendix E33). Such a policy was most likely to be in effect in private institutions or in departments with training grants. However, 50 percent of these departments indicated that they would remove the policy if federal and other sources of support were sharply cut back.

Impact of Lost Training Grant Support

About 87 behavioral science departments lost traineeships between 1972 and 1975. These departments showed a modest 6 percent decline in full-time enrollments from 1973 to 1976 (Appendix E40.2). Some of this lost support was recovered by increases in teaching assistantships (7 percent) and other forms of support.

When the 55 departments that experienced both traineeship and full-time enrollment losses were asked their explanation for the enrollment loss, over 60 percent marked the nonavailability of alternative stipend support as the primary reason (Appendix E42). Where behavioral science departments have shown growth in traineeships, they have also shown a marked increase (53 percent) in the number of self-supported students (Appendix E40.2).

The impact of lost training grant support is not limited to changes in the patterns of student support. Program activities supporting student research (e.g., research equipment, supplies, and computer time), program support staff, and travel to professional meetings were mentioned by nearly 70 percent of the departments as being moderately or severely curtailed by current or potential training grant cutbacks (Appendix E44). At the same time, the activities most frequently identified as central to the training grant concept--special seminars and interdisciplinary training--were cited less frequently, although by a majority of departments, as being adversely affected if training grants were eliminated.

THE MARKET FOR BEHAVIORAL SCIENCE PERSONNEL

In its 1977 report, the Committee reported a slight decline in the proportion of the behavioral science Ph.D. labor force that was employed in the academic sector between 1972 and 1975 and also determined that the proportion of behavioral science Ph.D.'s planning employment in the academic sector upon graduation had decreased from 59 percent in FY 1969 to 49 percent in FY 1976.

Since a shift to employment in the nonacademic sector in the behavioral sciences has been confirmed by a number of sources (Pallak, 1978; Dynes, 1978), the Committee and its Panel on Behavioral Sciences undertook to explore in greater detail the types of activities that characterize nonacademic employment for these scientists. Using data derived from the 1976 NRC Survey of Biomedical and Behavioral Scientists, comparison was made of 1971-75 nonclinical[6] behavioral science Ph.D.'s employed in academic settings in October 1976, with those employed in nonacademic sectors.

This analysis revealed that an estimated 8,130 nonclinical behavioral scientists completing their doctorates between 1971 and 1975 were employed or holding postdoctoral appointments in academic settings in October 1976, in comparison to the nearly 2,000 found outside the academic sector (Appendix G1.1 and G1.2).

A larger fraction of those academically employed reported spending some part of their time in research than those in nonacademic settings (90 percent versus 73 percent, respectively). However, the average time spent in research was about 30 percent for both groups (Table 3.3).

With respect to the type of research involved, a larger proportion of the behavioral scientists employed in nonacademic settings reported that their work was clinically oriented (48 percent) than did their academic counterparts (37 percent) (Appendix G4.1 and G4.2). As Table 3.4 reveals, a slightly larger fraction of those employed in nonacademic settings reported their work to be directly related to health (40 percent versus 33 percent).

Over two-thirds of those doing research in academic settings reported nonfederal sources to be the primary source of support for research (Table 3.4). The inverse was found for those employed in nonacademic sectors. That is, over 60 percent of

TABLE 3.3 Work Activities of 1971-75 Behavorial Science Ph.D Recipients by Employment Sector

		Employment Sector									
		Academic					Nonacademic				
		Total	Anthropology	Psychology	Sociology	Other	Total	Anthropology	Psychology	Sociology	Other
Average time spent in:											
TOTAL	%	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Research and development	%	29.3	29.6	30.8	27.4	23.6	31.4	46.1	29.0	40.3	25.6
Teaching	%	48.7	54.1	45.9	53.3	48.3	5.3	2.7	5.8	4.4	5.4
Management and administration	%	11.7	10.4	11.5	12.2	13.7	22.9	28.7	23.0	19.8	24.1
Consulting	%	4.4	2.4	4.8	3.6	3.9	16.8	9.5	17.1	21.9	9.7
Other professional services	%	4.4	1.8	5.1	2.7	8.1	21.1	8.8	22.6	10.9	34.0
Other activities	%	1.7	1.6	1.9	0.7	2.3	2.5	4.3	2.5	2.6	1.1
Percent of employed Ph.D.'s in some research	%	89.6	94.1	86.8	95.2	88.3	72.6	87.1	70.0	80.8	69.5
Survey item responses	N	2,261	286	1,458	276	241	492	23	364	50	55
Estimated total Ph.D.'s	N	8,130	1,087	4,690	1,643	710	1,893	107	1,295	299	192

SOURCE: NRC, Survey of Biomedical and Behavioral Scientists, Washington, D.C., 1976

TABLE 3.4 Health-relatedness and Source of Support for Research Conducted by 1971-75 Behavioral Ph.D.'s by Employment Sector

		Employment Sector									
		Academic					Nonacademic				
		Total	Anthropology	Psychology	Sociology	Other	Total	Anthropology	Psychology	Sociology	Other
Research related to health											
TOTAL	%	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Directly	%	33.3	25.3	35.9	28.8	40.8	39.8	35.3	40.7	34.3	47.4
Indirectly	%	47.0	48.6	48.5	43.9	41.3	38.5	14.7	38.0	50.9	31.9
Not at all	%	19.7	26.1	15.6	27.2	17.9	21.6	50.0	21.4	14.8	20.7
Research support from:											
TOTAL	%	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Nonfederal sources	%	67.8	69.7	64.9	72.7	71.4	38.9	26.6	39.6	37.4	44.9
Federal sources	%	32.2	30.3	35.1	27.3	28.6	61.1	73.4	60.4	62.6	55.1
NIH	%	12.8	8.2	15.8	6.9	15.5	5.0	0.0	4.7	4.7	11.2
ADAMHA	%	7.7	5.8	9.4	6.7	1.4	11.0	14.1	10.6	15.9	1.9
HRA	%	1.5	0.5	0.8	4.3	0.0	1.4	0.0	0.8	4.7	0.0
Other federal sources	%	14.8	19.2	13.8	15.4	13.3	48.5	68.8	48.5	45.3	42.1
Survey item responses	N	2,030	269	1,238	260	213	356	20	258	40	38
Estimated total researchers	N	7,249	1,017	4,068	1,539	625	1,317	81	879	236	121

SOURCE: NRC, Survey of Biomedical and Behavioral Scientists, Washington, D.C., 1976.

those doing research in the nonacademic setting reported the federal government to be the primary source of support, a finding to be explored in greater detail in the coming year.

Significant variations in response regarding the importance of postdoctoral training may be noted among behavioral science fields. Postdoctoral training was judged more frequently to be necessary by psychologists than by other social scientists regardless of their work settings (Appendix G6.1 and G6.2).

Behavioral scientists who took postdoctoral training within 1 year of earning a doctorate made up about 13 percent of the total number of 1971-75 behavioral science Ph.D. recipients in both the academic and nonacademic sectors (Appendix G9.1 and G9.2). Furthermore, over half in each employment setting indicated that the postdoctoral appointment was taken either for research experience or to switch fields. About one-fifth of the respondents in each sector indicated that the absence of employment opportunities led them to take postdoctoral appointments.

From these data, the Committee has concluded that employment in nonacademic settings does not lessen the opportunities for behavioral scientists to conduct health-related research. With respect to the development of NRSA policy for the behavioral sciences, this information suggests that guidelines for payback should continue to be liberally applied to encourage certain types of nonacademic employment where opportunities arise to conduct research related to national health needs.

Statistics describing the employment characteristics of behavioral science Ph.D.'s are useful in tracing the supply and utilization of scientific personnel. They do not shed much light on the reasons for changes, however, and say little about the quality of the scientific enterprise (Kuh, 1978). Hence, changes in employment require careful exploration:

- Why are these patterns changing?
- Are these changes temporary or permanent?
- How is mobility distributed among more and less productive behavioral scientists?

While the Committee has shown the work activities of 1971-75 nonclinical behavioral science Ph.D.'s to be strikingly similar whether they are employed in academic or nonacademic settings, the impact of the shift to nonacademic employment on the quality of the national health research enterprise must continue to be given careful consideration by the Committee and its Panel on the Behavioral Sciences in the coming year.

RECENT TRENDS IN RESEARCH ON BEHAVIOR AND HEALTH

In its 1976 report, the Committee called for more emphasis on research training in the area of behavior and health. Since that time, there have been some signs of additional interest in this research enterprise which confirm the Committee's recommendations.

A substantial audience attended the 1977 symposium sponsored by the Committee's Panel on Behavioral Sciences at the annual meeting of the AAAS. The symposium emphasized career opportunities in this area.

In the same year, a Conference on Behavioral Medicine was convened at Yale to define and state the goals of research in behavioral medicine (Schwartz and Weiss, 1978). This Conference culminated in the formation of the "Academy of Behavioral Medicine Research," which convened its first steering committee meeting in Washington, D.C., in April 1978 under the auspices of the National Academy of Sciences Institute of Medicine (NAS IOM) (Baldwin, 1978).

Furthermore, at its 1978 annual meeting in Toronto, the American Psychological Association established a Division on Health Psychology which has as its goals:

> (a) to advance contributions of psychology as a discipline to the understanding of health and illness through basic and clinical research . . .; (b) to promote education and services in the psychology of health and illness; and (c) to inform the psychological and biomedical community, and the general public, on the results of current research and service activities in this area.[7]

In addition to receiving greater attention in the scientific sector, research on behavior and health has enjoyed increasing attention from federal officials.

In a speech before the American Federation for Clinical Research, DHEW Secretary Joseph Califano identified five tentative principles that might underlie the 5-year plan for the department:

> The most basic principle, in my judgment, should be this: to maintain, at a high level, and enhance our support for fundamental research into biology and behavior . . . . As we maintain our support for health research we should recognize several important dimensions of this principle: . . . . There must be a diversity

> in the research we support. The population-based life sciences--biostatistics, epidemiology, various behavioral sciences--are at least as basic to our understanding of health as the more affluent and popular consumers of research dollars, biochemistry and molecular genetics (Califano, 1978).

An *ad hoc* Study Section on Behavioral Medicine has already been established at NIH to review all research proposals which contribute to a better understanding of behavior relevant to the interests of NIH. Several NIH institutes are also beginning to actively solicit proposals for behavioral research training under the auspices of the NRSA authority, most evident in the announcements of the National Heart, Lung and Blood Institute and the National Institute for Dental Research (Evans, 1978).

Research findings are now published in such journals as the *Journal of Behavioral Medicine* (Plenum Press), *Women and Health* (Haworth Press) and the *Journal of Health and Social Behavior* (American Sociological Association). Topics that have been identified include research on life crises and their influence on health; biobehavioral studies of pain and its control; the impact of psychological stress on susceptability to infections; degenerative diseases and malignant disorders; the role of early experiences on stress tolerance in later life; and personality differences in cardiac disorders.

In summary, research on the role of behavior in the occurrence of physical illness and the maintenance of health has enjoyed support both within the scientific commmunity and in the government sector. The Committee continues to believe that emphasis on predominantly postdoctoral training in the behavioral sciences will foster appropriate interdisciplinary training in this area and will yield a cadre of investigators whose research experience will contribute to the advancement of this important research enterprise.

RECOMMENDATIONS

Predoctoral/Postdoctoral Support

The Committee has reviewed information provided by the scientific community concerning the anticipated impact of its recommendation to shift research training support in the behavioral sciences primarily to the postdoctoral level.

While critics of this recommendation assert that a reduction in predoctoral support may ultimately result in a shortage of needed research personnel, available statistics continue to support the wisdom of a shift to predominantly postdoctoral support.

Labor market projections through 1983 suggest that total graduate and undergraduate enrollments in the nonclinical behavioral sciences would have to expand at an annual rate of at least 3.5 percent in order to provide a reasonable expectation of academic employment for nonclinical behavioral science Ph.D.'s now completing their training (Table 3.2). Together with the report by behavioral science department heads that there is an observed "moderate" to "critical" surplus of recent Ph.D.'s (Appendix E34-35), these data suggest that continuation of the current emphasis on predoctoral support in the behavioral sciences by NIH/ADAMHA will contribute to a surplus of Ph.D.'s unless nonacademic employment opportunities expand markedly.

The Committee thus recommended last year that predoctoral support be concentrated in those fields essential to mental health research, where significant advances are now taking place; in those fields, such as anthropology and demography, that depend on predoctoral support for fieldwork; and in certain innovative areas, such as research on the role of behavior in physical illness and the maintenance of health.

Although a shift to predominantly postdoctoral support, with a steady-state budget, will result in the curtailment of predoctoral awards in some departments currently receiving support, findings from the Department Survey suggest that reduced NRSA support does not necessarily mean major reductions in graduate enrollments. Departments that have lost predoctoral training grant support show only a modest decline in full-time enrollments, since the loss has been compensated for largely by funds from a variety of other sources (Appendix E40.1-E40.3).

The full impact of the proposed shift to predominantly postdoctoral research training support at this time cannot be predicted completely. One reason is that the behavioral sciences rely more heavily than do the biological sciences on nonfederal sources of support. In the behavioral sciences, the amount of support for postdoctoral training that comes from nonfederal sources is more than twice that in the biological sciences (44 percent versus 20 percent) (NSF, 1973-77). Therefore, careful monitoring of emerging enrollment and employment patterns, as well as identifiable national research needs, must continue.

Certain information has come to the attention of the Committee that suggests clarification must be made of the method by which such recommendations are to be implemented. Specifically, the Committee wishes to make clear that the recommendations for behavioral science research training support, found in its 1976 and 1977 reports, and in the statistical summary tables in Chapter 1 of this report, represent the sum total of NRSA awards in the behavioral sciences and do not specify how these should be allocated between the various federal agencies or among the many institutes.

It is not expected that each institute or agency will necessarily achieve the recommended 30 percent predoctoral/70 percent postdoctoral ratio in the behavioral sciences by FY 1981. The missions of the various institutes of health (e.g., Heart, Lung, and Blood; Alcohol; Child Health and Human Development; *et al.*) may require different ratios of predoctoral support to postdoctoral support in the behavioral sciences as new training specialties emerge. Careful coordination of training fund allocations should be undertaken to allow variation according to special needs while the overall goal of a 30:70 ratio of predoctoral to postdoctoral awards is being achieved.

Recommendation. The Committee recommends that a *joint* policy be developed by NIH and ADAMHA for implementing the Committee's recommendations so as to permit suitable departures from the recommended overall ratio of 30 percent predoctoral/70 percent postdoctoral support by those institutes that can demonstrate a need for expanding their support of predoctoral research training.

Postdoctoral training represents a departure from the typical career pattern for the behavioral scientist, although statistics reveal that the number of postdoctoral appointments taken by nonclinical behavioral scientists has been growing at a rate of more than 10 percent per year since 1972.

In its 1977 report, the Committee suggested that postdoctoral training is a means for behavioral scientists to strengthen research skills in such areas as population research, evaluation research, and the role of behavior in disease development. Postdoctoral training also extends cooperative study of brain functions by neurobehavioral scientists interested in such processes as sleep, sensation and perception, learning, and emotions. Finally, in the area of behavior development, postdoctoral training may facilitate research on hyperkinesis, autism, and various forms of mental retardation.

In view of the fact that demographic projections indicate that the elderly population in the United States will more than double in the next 50 years, so that 20 percent of the population will be over 65 years old in the year 2030 (Butler, 1978), it is clear that an urgent need exists to assure that skilled investigators are available to take up the complex research issues of aging. The Committee and its Panel on Behavioral Sciences believe that research training in the behavioral sciences related to aging ought most properly take place at the postdoctoral level.

As the data from the 1976 Survey of Biomedical and Behavioral Scientists make clear, postdoctoral research training plays a much greater role in some behavioral sciences than in others. The Committee hopes that increased support for postdoctoral training will make it more common in those fields where it is now rare and thus improve the quality of health research specialists in these disciplines.

Recommendation. The Committee reaffirms its recommendation that a ratio of 30 percent predoctoral/70 percent postdoctoral be achieved by FY 1981. The Committee recommends further that this ratio be maintained through FY 1982 (Table 3.5).

Traineeships/Fellowships

In its 1976 report, and again in 1977, the Committee recommended that the proportion of traineeships to fellowships in the behavioral sciences be maintained at levels comparable to that reported in FY 1976, namely at a ratio of 82 percent traineeships to 18 percent fellowships. The Committee has not acquired any information that would suggest that this proportion is a barrier to the production of needed investigators in the behavioral sciences at this time.

Testimony has been presented to the Panel on Behavioral Sciences which suggests that the maintenance of this ratio, coupled with a shift to predominantly postdoctoral training, could limit the availability of predoctoral fellowships in certain important areas of the behavioral sciences. However, the Committee has reviewed data provided by ADAMHA for 1976 and FY 1977 and notes that in actual fact there was an increment in the number of new predoctoral fellowships awarded during that period. Of the 123 new NRSA fellowships reported by ADAMHA in FY 1977, 64 were made for predoctoral training. This may be compared to 45 predoctoral fellowships out of a total of 124 awarded in the behavioral sciences in FY 1976.

Recommendation. The Committee reaffirms its recommendation that the proportion of traineeship to fellowship awards be maintained at a ratio of about 80 percent to 20 percent through FY 1982.

Minority Research Training Support

In its 1977 report the Committee formally recommended that ADAMHA waive its regulation that restricted NRSA predoctoral support to graduate students who have already completed 2 years of graduate studies. This waiver was suggested "to encourage more minority

TABLE 3.5 Committee Recommendations for NIH and ADAMHA Predoctoral and Postdoctoral Awards in the Behavioral Sciences

Agency Awards and Committee Recommendations	Fiscal Year							
	1975	1976	1977	1978	1979	1980	1981	1982
Actual awards								
Total	*1,966*	*1,801*	*1,738*					
Pre	*1,754*	*1,401*	*1,352*					
Post	*212*	*400*	*386*					
1976 recommendations								
Total		1,860	1,740	1,590				
Pre		1,500	1,200	850				
Post		360	540	740				
1977 recommendations								
Total					1,490	1,390	1,300	
Pre					745	575	390	
Post					745	815	910	
1978 recommendations								
Total						1,390	1,300	1,300
Pre						575	390	390
Post						815	910	910

applicants to enter and complete graduate training without undue delay" in behavioral and other science research careers (NRC, 1975-77: 1977 report).

The Committee notes that this recommendation has not been implemented. ADAMHA has indicated, however, that an effort is being made to develop special targeted training program(s) that limit eligibility to members of minority groups and do not prohibit supporting students in their first two years of training.[8] The Committee endorses this effort and notes that it is consistent with the tenor of some of the discussion at its public hearings.

Nevertheless, the importance of cultural heterogeneity in a pluralistic society--a point that was emphasized in the public hearings--together with the opinion of some witnesses that special targeted training programs were not sufficient or were inappropriate make the Committee unwilling to abandon its recommendation that ADAMHA waive the "two-year restriction" for minority group students. Directors of non-targeted training programs continue to report difficulty in recruiting qualified minority students to begin their training. Whether the two-year restriction is a significant deterrent is not wholly clear. The Committee has commissioned a special study of conditions that limit minority participation in graduate training for biomedical and behavioral research; and it hopes that this study will be helpful in suggesting the most appropriate means for overcoming the limiting conditions. Finally, pending the assessment of effectiveness of existing minority targeted programs in several behavioral sciences, the Committee remains of the opinion that it would be desirable for ADAMHA to waive the two-year restriction in the case of students who are members of minority groups.

Recommendation. The Committee recommends that ADAMHA waive its two-year restriction to permit recruitment of minority scientists through current NRSA programs. Such a recommendation becomes increasingly feasible in the face of the congressional proposal to extend NRSA predoctoral research training support to a total of 5 years.

The Committee commends ADAMHA for its efforts to develop special programs for minorities. At the same time, however, the need continues to recruit such personnel through current programs.

CLINICIANS IN MENTAL HEALTH RESEARCH[9]

Some psychologists and psychiatrists active in mental health research have brought to the attention of the Committee both in

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public testimony and private communications their concerns about the administration of programs to train clinicians to conduct mental health research. One important concern is that the separation of research training from clinical training for the purpose of allocating federal support[10] eventually will erode the research base in such service-oriented Ph.D. fields as clinical psychology (Garmezy, 1978). Another concern is that NIMH has provided little "innovative thrust" in recent years toward recruiting psychiatrists into research careers (President's Commission on Mental Health, 1978).

At the request of the Committee, the Panel on Behavioral Sciences, in cooperation with the Panel on Clinical Sciences, has examined these assertions and has developed a preliminary analysis of them. Specifically, the Panel has reviewed and commented on 1) the approach developed by ADAMHA to assign applications for predoctoral training support from the mental health professions within their agency, 2) some of the disincentives to careers in mental health research, and 3) opportunities for multidisciplinary research training.

Classification of Predoctoral Applications by ADAMHA

When the NRSA Act required that a distinction be made between clinical training and research training, ADAMHA, which had long provided support for both types of training through NIMH, established guidelines by which existing awards could be assigned to either the clinical or the research training category "as the preponderance of evidence"[11] from the grant applications suggested. Since that time, the agency requires applicants seeking training support to declare their intent to pursue research or clinical careers[12] and, accordingly, assigns them to the appropriate program of support.

The effect of these actions on the development of a pool of clinician investigators in mental health research is not yet clear, although this assignment process appears to affect more significantly the acquisition of predoctoral research training support, especially for predoctoral clinical psychologists.[13]

As one ADAMHA official has pointed out:

> The necessity of making such distinctions was, of course, related to the requirements of NRSA with respect to pay-back, limitation on the number of years of support, etc. We knew of no way to accommodate these legal and other DHEW policy requirements within undifferentiated . . . grants.[14]

To clarify the relationship between NRSA program administration and the recruitment at the predoctoral level of

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clinicians for mental health research, the following assessments are provided for the fields of clinical psychology and psychiatry.

Clinical Psychology. Traditionally, predoctoral programs in clinical psychology have involved 4 to 5 years of study toward the Ph.D., during which time the individual has initially focused on acquiring those skills that characterize all doctorally trained psychologists.

> Invariably these skills include a definitive immersion not only in the contents of one's specialty but also work in research methodology, advanced statistical and quantitative methods, statistical design, computer training, etc. These skills . . . are joined to active research participation during the predoctoral years . . . .[15]

What distinguishes these clinical psychology[16] doctoral students from their nonclinical peers is the intensive exposure to various forms of human service delivery, culminating in an internship period at institutions accredited by the American Psychological Association, at which time the clinical psychology student engages in the supervised performance of testing, diagnosis, and/or treatment of clients.

Since Ph.D. clinical psychology doctorates can either provide services or conduct research, with many actually doing both (NRC, 1975-77: 1977 report), the distinction between clinical and research training drawn by federal agencies for administrative purposes appears to some clinical psychologists to be artificial or, at best, arbitrary.

This is especially the case when entire training grant programs must be categorized, although the distinction is not entirely impossible to draw on an individual basis.

With respect to individual support, clinical psychologists have been supported as predoctoral NRSA fellows if they have been willing to declare their intention to pursue research careers. Indeed, in recent years about half of the fellowships awarded by the Psychological Sciences Fellowship Section of NIMH have been at the predoctoral level. Of these, about 40 percent are made for research training in the area of "maladaptive behavior and mental illness." About 35 percent of the total awards in this area have been made to predoctoral clinical psychologists.[17]

In the view of many persons responsible for predoctoral training in psychology, the distinction between clinical and research training appears to be an impediment in the allocation of NRSA predoctoral institutional research training grants. As of FY 1978, no predoctoral institutional research training grants had been awarded to clinical psychology programs under the NRSA authority.[18]

The Committee is aware of the fact that clinical psychology continues to be eligible for training support under both training authorities. However, evidence reviewed in the past year suggests that the oversimplification of the content of clinical programs in order to qualify for training support may, in the long run, adversely affect the development of graduate training in clinical psychology.

Some clinical psychologists believe that this manner of implementing the distinction between research and clinical training will erode the research tradition in clinical psychology. They also believe that the distinction encourages the "professional degree" movement in psychology,[19] a situation that in recent years has stirred much controversy within the psychology community.[20]

The complexity of these developments suggests that a more extensive examination of the impact of the NRSA authority on research training opportunities for predoctoral clinical psychologists is required before a clear recommendation can be provided by the Committee.

Psychiatry. Physicians get little or no formal research training either at the predoctoral level or during their residencies. The Director of ADAMHA summarized the situation as follows:

> We must acknowledge that the recruitment of physicians into research and academic careers occurs from a biased population. The vast majority of students who enter medical school do so with the intention of practicing medicine . . . . It follows that psychiatry, along with other medical specialties, when recruiting for investigators at the postgraduate period, is recruiting among people who most likely entered medical school with a particular objective in mind and have already made a tremendous investment in pursuit of the objective.[21]

The National Institute of General Medical Sciences (NIGMS) some years ago established the Medical Scientist Training Program (M.D./Ph.D.),[22] now under the NRSA authority, as a means to foster research careers early in the training of physicians. Occasionally, this program has provided research training for clinicians who subsequently conduct mental health research.[23] However, there is no program of this type offered by ADAMHA at the present time.

Currently, research training in psychiatry under the NRSA authority is supported through NIMH programs in the biological sciences, social sciences, and "special areas." Interdepartmental grants are made in which departments of psychiatry are coequal to other participating departments. In FY 1977, support for 231 positions was provided through 51 new or continuing interdepartmental grants. However, only 44 of the 231 positions represented predoctoral awards, and a small fraction of these were made to individuals specializing in psychiatry. This suggests that medical students are not being recruited in significant numbers into research careers under the NRSA program.[24]

It is not clear at this point whether the failure of the NRSA program to recruit physicians, including psychiatrists, into mental health research suggests the need for a targeted program such as the M.D./Ph.D. program mentioned earlier. The Committee notes that the Research Task Panel of the President's Commission on Mental Health (1978) has urged ADAMHA to establish a research training program of this kind in the near future. The Committee will explore this and other alternatives to the recruitment of these clinicians in the coming year.

Recruitment Disincentives

The Committee notes that the number of psychiatrists in the U.S. labor force actively engaged in research as a primary activity has remained steady in recent years at a level of only 1.8 percent (450 persons) of the active psychiatry labor force (AMA, 1975-77). The absence of significant expansion may be due to the fact that physicians who elect research careers are more likely to experience a significant net economic loss over a lifetime than are those who chose to enter private practice, although this loss is smaller in the medical specialties of psychiatry and pediatrics than in fields such as medicine and surgery (Scheffler, 1975).

The difference between salaries for clinical and residency training and NRSA stipends has also been cited as a disincentive to the recruitment of physicians for clinical research (NRC, 1975-77: 1977 report). While this may be an important factor, it does not entirely account for the lower recruitment rate from such medical specialties as psychiatry, since NRSA stipend levels are uniform for all M.D.'s.[25]

With respect to nonphysicians, the Committee notes that nearly 60 percent of the 1971-75 clinical psychology doctorates surveyed in 1976 reported that they spent some portion of their total work time in research (NRC, 1975-77: 1977 report). While these figures are encouraging, the potential impact of predoctoral funding patterns discussed earlier suggests that the recruitment of investigators in this field warrants close monitoring.

Barriers to the recruitment of clinicians are not well documented and typically represent little more than the fragmented observations of experts. The Committee and its Panel on Behavioral Sciences will continue to develop systematic approaches to an examination of these recruitment factors, hoping to draw from the findings of parallel research efforts, such as the current study of academic psychiatry by the Josiah Macy, Jr., Foundation.[26]

Sites for Training

Effective research training requires an appropriate research support environment, i.e., skilled researchers who can guide the research experience, suitable space and equipment, and adequate opportunities for clinical observation.

As a result of the release of the report by the President's Commission on Mental Health (1978), clinicians undoubtedly will be expected to conduct research to an increasing degree not only on the causes of mental and emotional disorders, but also on the efficacy of various treatments, especially as they apply to the underserved population.[27] Therefore, a renewed emphasis is needed on strengthening the quality, number and kinds of sites where formal research training for these clinicians can take place.

For nearly 30 years, the mental health professions, and clinical psychology in particular (Shakow, 1978), have received federal funds to strengthen academic departments in order to provide suitable clinical and research experiences for these personnel. However, participants at the ad hoc steering committee meeting convened in January by the Panel on Behavioral Sciences (Appendix C) pointed out that few departments of psychiatry are able to provide psychiatrists with high quality research training at this time. The availability of academic departments which are able to provide sound research training to mental health professionals clearly requires examination in light of anticipated recruitment efforts in this area.

Alternatives to traditional department-based research training are also beginning to appear. In recent years, for example, an effort has been made by the federal government to establish centers of research relevant to the component institutes of ADAMHA (NIMH, NIDA and NIAAA) at qualified universities throughout the country.[28] Organized around a common research theme (e.g., the genetics and epidemiology of alcoholism), each research center receives support for individual research projects as well as core support for administrative and related services. These centers are eligible to apply for NRSA training support, although research training is not central to their operation. In the coming year the Committee and its Panel on Behavioral Sciences will assess the feasibility of using these Centers as research training sites for clinicians.

Other approaches to predoctoral and postdoctoral research training for psychiatrists, clinical psychologists, psychiatric nurses, and related mental health professionals also need to be examined. Especially pressing is the need to bring clinicians from different disciplines together for multidisciplinary training in order to foster advances in the comprehensive treatment of mental health problems, alcohol, and drug abuse.

FOOTNOTES

1. In its 1976 report, the Committee recommended an orderly tapering down of predoctoral support in the behavioral sciences "with a concomitant emphasis on providing for research specialization through postdoctoral training" (NRC, 1975-77: 1976 report, page 10). The shift from the then-current proportion of 90 percent predoctoral and 10 percent postdoctoral to a ratio of 30:70 was recommended by the Committee in the belief that "sufficient opportunity for training in the behavioral sciences at the postdoctoral level will be assured, while an adequate number of awards for basic research training at the predoctoral level will also be maintained" (NRC, 1975-77: 1976 report, page 10).

2. These three subfields of psychology have been identified as predominantly service-oriented fields, based in part on responses to the 1976 NRC Survey of Biomedical and Behavioral Scientists (NRC, 1977a) and the recent survey of health service providers conducted by the American Psychological Asssociation (Gottfredson and Dyer, 1978). Analysis of the labor market for these personnel will continue as the relationship between factors which influence the demand for research personnel from these fields is better understood.

3. While it is recognized that the speech and hearing sciences may be considered clinically oriented fields, findings from the 1976 NRC Survey of Biomedical and Behavioral Scientists reveal that over 75 percent of the 1971-75 communication science doctorates were employed in the academic sector and that over 84 percent of the communication scientists surveyed reported that they spent some part of their total work time engaged in research. Similarly, the findings of the NRC Committee on Manpower Needs for Teaching and Research in Basic Neurologic and Communicative Sciences (NIH, 1977b) seem to support the Committee's view that this group is most appropriately considered part of the nonclinical behavioral science labor force.

4. As the Committee analysis of this labor market continues, the relationship between business and government employment of nonclinical behavioral Ph.D.'s and behavioral sciences R and D expenditures in these sectors will be examined. If such a relationship can be empirically demonstrated, it can be used to make projections of demand in the nonacademic sectors that complement those in the academic sector.

5. Definitions of departmental characteristics may be found in Appendix El.

6. Responses from clinical psychologists and counseling and guidance psychologists have been eliminated from this analysis because of the special employment characteristics of these service-oriented professions. The 1976 survey findings for these psychologists are provided in the 1977 report of the Committee, although the data are not disaggregated by employment sector.

7. Petition for a Division of Health Psychology, sponsored by Joseph Matarazzo, University of Oregon, and Stephen Weiss, NIH, to the APA Board of Directors, May 1978.

8. David Kefauver, ADAMHA, in a statement before the Panel on Behavioral Sciences, April 15, 1978, Washington, D.C.

9. The term "clinician" is used here to denote health professional. While in some instances this corresponds to such degree types as the M.D., D.D.S., D.V.M., or D.N.S., it also includes the service-oriented academic doctorates from such fields as clinical psychology, counseling and guidance psychology and others.

10. In developing a separate research training authority in 1974, a report of the Committee on Interstate and Foreign Commerce of the U.S. House of Representatives notes that:

> [I]n writing this legislation the Committee has felt it appropriate to restrict its application to actual research training . . . . For this reason, the legislation contains a specific restriction to the effect that training provided shall not include residency training for health practitioners . . . . The term 'residency training' used in the legislation applies strictly only to post-graduate training of physicians but in fact the Committee would include in this restriction clinical and practice training for other human service professions listed above. (U.S. Congress, 1973.)

The clinical professional training authority continues under Section 303 of the Public Health Service Act.

11. David Kefauver, ADAMHA, in private correspondence to NRSA Committee member Peter Barton Hutt, March 24, 1978.

12. Stanley Schneider, NIMH, memorandum to NRSA staff officer Pamela Ebert-Flattau, April 10, 1978.

13. One hundred individuals were classified as "clinical investigators" in FY 1977 which included about 30 M.D.'s and a number of postdoctoral clinical psychologists (David Kefauver, ADAMHA, April 15, 1978, op. cit.).

14. D. Kefauver, March 24, 1978, *op. cit*.

15. Norman Garmezy, University of Minnesota, in private correspondence to NRSA Committee Chairman Henry W. Riecken, June 21, 1978.

16. Service oriented subfields of psychology include clinical psychology, community psychology, counseling and guidance psychology, and school psychology. Clinical psychology has been selected here to represent the situation for related service-oriented subfields of psychology.

17. S. Schneider, April 10, 1978, *op. cit*.

18. S. Schneider, *ibid*.

19. The establishment of "professional schools of psychology" has resulted in the appearance of doctorally trained psychologists whose degree, the Psy.D., reflects almost exclusive training in services delivery at the expense of research training.

20. N. Garmezy, June 21, 1978, *op. cit*. The Committee notes, however, that an American Psychological Association task force has proposed accreditation guidelines which would permit professional degree programs in clinical psychology to apply for APA approval (APA *Monitor*, June 1978).

21. Gerald Klerman, ADAMHA, in private correspondence to William Bevan, Chairman, Panel on Behavioral Sciences, May 17, 1978.

22. See Chapter 4 for the Committee's recommendation for that program.

23. Vincent Price, NIGMS, private communication, NRSA staff officer, Pamela Ebert-Flattau, December, 1977.

24. G. Klerman, May 17, 1978, *op. cit*.

25. G. Klerman, May 17, 1978, *ibid*.

26. Commission on the Present Condition and Future of Academic Psychiatry, New York.

27. According to the President's Commission on Mental Health, the underserved include children, adolescents, older Americans, racial and ethnic minorities, the urban poor, migrant workers and others.

28. These include Clinical Research Centers, Alcohol Research Centers, and Drug Research Centers, any combination of which may be located at the same institution.

4. CLINICAL SCIENCES

The Committee's assessment of the market for personnel in the clinical sciences has not changed since publication of the 1977 report. A strong demand is expected to continue over the next few years. At the same time, numerous indications point to a disturbing decline in the attractiveness of a career in clinical research, which has serious implications for the supply side of this market. The clearest indications of a diminishing supply are:

- A sharp drop-off has occurred in the proportion of physician-investigators among all first-time principal investigators on NIH research grants. The proportion fell from 43.9 percent in FY 1966 to 22.3 percent in FY 1975 (Douglass and James 1973; Challoner, 1976). Concomitantly, there was a decrease in absolute numbers of physicians as first-time principal investigators from 471 to 305, despite an increase over the decade in the total number of grants from which these percentages were derived.

- Data from the American Medical Association (AMA) show that the number of physicians reporting research as a primary activity has decreased from 15,441 in 1968 to 7,944 in 1975 (AMA, 1963-74 and 1975-77). This represents an average annual decrease of 9 percent. However, the most recent data show an increase of 7 percent from 1975 to 1976. The Committee does not know how much significance to attach to this apparent reversal of a long-term trend.

- The number of postprofessionals in research training programs supported by NIH has fallen from approximately 4,600 in 1971 to 1,800 in 1977 (NIH, 1966-78). This is an average annual decrease of 14 percent.

- Budgeted vacancies in clinical departments have grown about 11 percent per year since 1971, compared with 4 percent in basic science departments at medical schools (Table 4.1). A certain amount of these budgeted vacancies are undoubtedly the result of normal market conditions, but the long-term growth pattern is an indicator of an imbalance between supply and demand.

TABLE 4.1 Current Trends in Supply/Demand Indicators in the Clinical Sciences

	1971	1975	1976	1977	Average Annual Change	
					Growth Rate	Amount
Supply indicators:						
Professional doctorates participating in NIH training programs:						
Training grants and fellowships[a]	4,622[b]	3,248	3,164	1,843	-14.2	-463 (1971-77)
Training on research grants (full-time equivalents)	547 (1973)	565	NA	NA	1.6%	9 (1973-75)
Demand indicators:						
Expenditures for clinical R and D in medical schools (1967 $, mil.)	$118	$191	$177	NA	8.4%	$11.8 (1971-76)
Medical service income in medical schools (1967 $, mil.)	$ 94	$193	$231	NA	19.7%	$27.4 (1971-76)
Total clinical R and D and medical service funds (1967 $, mil.)	$212	$384	$412	NA	14.2%	$40.0 (1971-76)
Budgeted vacancies:						
Clinical departments	982	1,564	1,812	1,822	10.9%	140 (1971-77)
Basic science departments in medical schools	508	609	672	633	3.7%	21 (1971-77)
Labor force:						
M.D.'s primarily engaged in research	10,898	7,944	8,514	NA	-4.8%	-477 (1971-76)
Full-time faculty in clinical departments	18,451	26,280	28,602	30,207	8.6%	1,959 (1971-77)
Medical students	40,487	53,143	56,244	58,266	6.3%	2,963 (1971-77)

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[a] On duty in year shown. Numbers exclude the training programs of the Fogarty International Center.

[b] Includes an unknown percentage of trainees who were in predominantly clinical training programs.

SOURCES: AMA (1963-74, 1975-77), JAMA (1960-77), NIH (1966-78).

- A study of factors influencing physicians' career choices records a striking change in attitudes toward research. The proportion of medical students assigning high priority to research dropped from 49 percent in 1963 to 2 percent in 1976 (Funkenstein, 1978).

- Directors of training programs in medical schools report a dwindling interest in research careers on the part of the students. In a 1977 study of 12 academic medical centers, the Association of American Medical Colleges (AAMC) conducted interviews with directors of training programs that had the largest number of research trainees. Forty percent of these directors, despite intensified efforts to select persons motivated for academic careers, reported increased difficulty in keeping such trainees in research training programs (AAMC, 1978)

DEFINITION/CLASSIFICATION OF CLINICAL SCIENCES

A definition of the nature and purpose of clinical investigation is an essential starting point in examining the personnel market in this field. Definitions of clinical investigation differ mainly with respect to the boundaries of the research included under the term. The Committee limits the term to research on patients, on samples derived from patients as part of a study on the causes, mechanisms, diagnosis, treatment, prevention, and control of disease, or on animal studies by scientists identifiable as clinical investigators on the basis of their other work. Similar investigations of disease in animals, conducted mainly by veterinary scientists, parallel clinical research on disease in humans and could therefore be included under the clinical sciences rubric. The scientific techniques and instrumentation for clinical investigation may be similar to those in basic laboratory studies. Indeed, many of the ablest clinical investigators have had training in basic biomedical science and may also perform research on animals or with isolated tissue components.

The above definition focuses on the nature of the research rather than on the performer. Usually, clinical research is done by M.D.'s, but our definition does not exclude scientists with other degrees such as D.D.S., D.V.M., D.N., Ph.D., and other doctorates whose research fits this description.

Need for Clinical Investigation

Because of increasing but understandable constraints surrounding research on human beings, especially children, the identification, relative value, and means for investigation of animal models that may be used as surrogates for man has become a larger and more important activity in almost all institutions. There is at the present, however, no animal species or *in vitro* laboratory test system that is completely predictive for what will occur in the human with respect to an experimental drug or new procedure. No matter how much animal or laboratory data are gathered, it becomes necessary at some point to address the question, what do these data mean for man? Promising developments in the basic biomedical sciences must ultimately be applied and evaluated in human beings in order to establish the utility of new diagnostic and therapeutic methods. Clinical investigation represents a very difficult kind of research. Since much of clinical research is long-term in nature, its baseline characteristics are often not controllable, with little opportunity to modify experiments with rapid feedback. The numbers of variables that may affect the outcome are usually large and the analytic problems are more complex. Moreover, because such studies may require long-term follow-up of patients, there is the constant risk that segments of the sample may be lost through various forms of attrition. Clinical research is generally best performed in academic medical centers, inasmuch as collaboration with basic scientists occurs more easily in that environment, multidisciplinary teams are at hand to provide skills needed for comparative assessment of old and new methods, and appropriate facilities for human studies are available.

Clinical investigation takes many forms. It ranges from systematic observation of individual patients in a controlled environment to large-scale clinical trials involving thousands of subjects and the pooled effort of investigators in multiple institutions. It may consist of carefully controlled studies to elucidate the mechanisms of disease, or field epidemiologic research aimed at uncovering information about the etiology of disease. It provides the critical link between basic science and patient care. Hence, an essential aim of clinical investigation is the translation of new knowledge, through applied research, into new technology, as well as the validation of new technology through clinical trials. Other purposes of clinical investigation are to assess the reliability, sensitivity, and specificity of diagnostic procedures; to identify the possible hazards of therapeutic drugs; and to determine the efficacy of medical and surgical procedures.

Classification of Clinical Sciences

For an operational definition of clinical sciences, the Committee has relied upon the discipline/field/specialties list used by NIH to classify trainees and fellows (see Appendix D3). Accordingly, numerical recommendations for the Committee's reports have been based upon that taxonomy. At the same time, it is recognized that marketplace issues, such as financial disincentives and the payback provision of the NRSA Act, affect M.D.'s employed as basic biomedical scientists as well as clinical investigators and will have to be addressed separately from the field category in which the M.D. is counted. This leaves open the possibility that the Committee may wish at a later time to make degree-specific recommendations to NIH.

In line with the above operational definition, the Committee recognizes that individuals with doctorate degrees other than the M.D. participate in research and training activities classifiable as clinical sciences. For example, many Ph.D. candidates receive NIH-supported training in clinical fields. This points up the difficulty of distinguishing clearly in some instances between the basic biomedical and clinical sciences. Notable examples of fields that are difficult to classify as either basic biomedical or clinical are immunology, pathology, pharmacology, and microbiology. The resulting problem to the Committee in determining appropriate training levels in these areas is apparent and will be given further consideration as this study continues.

THE 1978 OUTLOOK FOR THE CLINICAL SCIENCES

For last year's report, the Committee reviewed trends in the supply of, and demand for, clinical investigators and concluded that demand quite likely would expand somewhat faster than supply if these trends were to continue through 1982. This conclusion was based primarily on an analysis of the relationships among clinical faculty in medical schools, medical student enrollments, and R and D expenditures in medical schools. A model similar to the one used for the biomedical sciences, in which the faculty/student ratio (F/S) was related to R and D expenditures, was also developed for the clinical sciences.

Between 1971 and 1975, medical student enrollments grew at about 7 percent per year and R and D expenditures at almost 6 percent per year. Both of these factors were viewed as important contributors to the 9 percent annual growth of full-time faculty in clinical departments in medical schools that had occurred between 1971 and 1975.

Revisions to Demand Model for Clinical Faculty

In order to make recommendations for research training under the NRSA Act in last year's report, the outlook for future growth in

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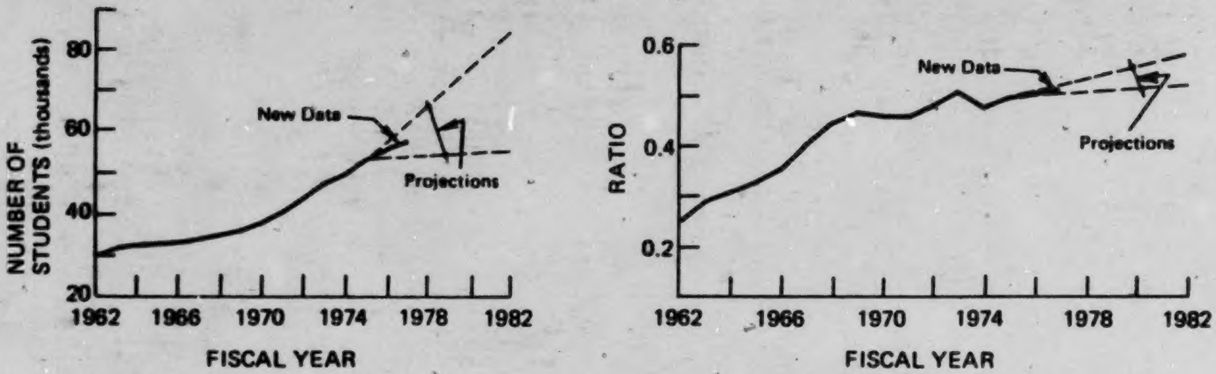
clinical faculty was considered under various assumptions about medical student enrollments and R and D expenditures from 1975 to 1982. A high, middle, and low assumption was made in each case. The resulting projections are reproduced in Figure 4.1 along with the new data on enrollment and faculty size that have recently become available. For the most part the new data fall quite comfortably within last year's projected limits. Medical student enrollment is slightly above the middle projection for 1977 (Figure 4.1b); and clinical faculty size for 1977 almost coincides with the middle projection (Figure 4.1c). R and D expenditures, however, is the one variable that does not conform to the projections, falling just below the projected lower boundary for 1976 (Figure 4.1d)

This comparison between the actual and projected data offers encouragement that in general the model upon which last year's projections were based is realistic and useful for predicting faculty/student ratios over the short run. However, some adjustment to the monetary variable (R and D expenditures) seems necessary, and this is the most important one relating to the demand for researchers. Last year, the Committee was concerned that total R and D expenditures in medical schools might be too broad a measure to use for assessing needs for clinical faculty. R and D expenditures in clinical departments was thought to be more appropriate, although the difficulty in estimating this quantity was recognized. Furthermore medical school income derived from patient-care activities on the part of clinical faculty members has risen sharply in recent years. This reflects the tendency in medical schools toward increasing emphasis on health maintenance and community service programs. It also suggests that a good portion of the recent expansion of clinical faculties has been due to the demands of these service-oriented activities rather than to research.

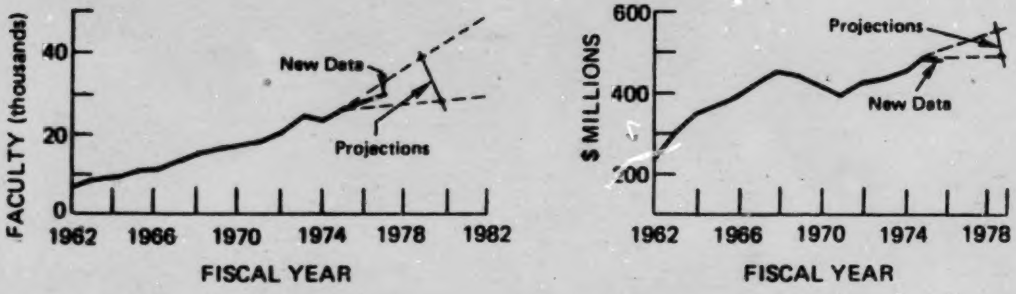
During the early 1960's, medical service income grew steadily at about 12 percent per year in real terms. But starting in 1968, a dramatic upswing has occurred--these funds have grown at a rate of more than 25 percent per year, and have overtaken estimated R and D funds as a source of revenue for medical schools (Table 4.1). This movement signifies an important shift toward patient care activities on the part of clinical faculty members, and must be recognized in any projections of demand for clinical faculty. This has been done by including medical service funds in the monetary variable of the model.

As revised, the monetary variable now is composed of the sum of medical service income and estimated expenditures for clinical R and D in medical schools. The latter is estimated indirectly from total R and D expenditures by a procedure explained in Appendix H. Medical service income on the other hand has been measured directly and reported annually in the Education Number of the Journal of the American Medical Association (JAMA) at least since 1957.



(a) Medical Student Enrollments

(b) Clinical Faculty/Student Ratio



(c) Clinical Faculty in Medical Schools

(d) R and D Expenditures in Medical Schools (1967 $)

FIGURE 4.1 Comparison of the Committee's projections made in last year's report with recent data on medical school enrollments, R and D expenditures, and clinical faculty (Appendixes F6 and F7; NRC, 1975-77: 1977 report).

The statistical relationship between the faculty/student ratio in clinical departments and funds available from clinical R and D expenditures and medical income is quite strong.[1] According to the best estimates available, the relationship is not linear, but appears to take on the typical S-shape exhibited by many growth processes. The growth pattern of the clinical faculty/student ratio implies that it passed through a period of rapid growth during the 1960's and has now entered a more stable period. If this pattern should continue, the ratio would respond more slowly to future changes in the level of clinical funds available in medical schools.

Revised Projections

The new projections resulting from the revised model are shown in Figures 4.2 and 4.3 and Table 4.2. Projections of the faculty/student ratio result from its relationship with clinical funds (i.e., total clinical R and D expenditures plus medical service income) and assumptions about the future levels of this monetary variable. The clinical faculty/medical student projections are translated into projected demand for clinical faculty by applying the projected levels of medical student enrollments. As before, high, middle, and low projections have been made for the monetary variable and medical student enrollments, reflecting the Committee's best estimate of likely future levels based on the behavior of these variables in the recent past (Figures 4.2 and 4.3).

With regard to clinical funds, under the high assumption, they are expected to grow at about 11 percent per year from the 1976 level of $422 million to $883 million in 1983. Under a more conservative assumption, and one which the Committee considers to be its best estimate, clinical funds would grow at about 7 percent per year to a level of $686 million by 1983. Under the most conservative assumption, which the Committee considers to be the lower bound, clinical funds would grow by only 2 percent per year to a level of $485 million by 1983.

In the case of medical student enrollment, growth is expected to slow from its present 6.3 percent annual rate to about 3 percent per year by 1983, at which time enrollment would reach a level of about 69,000 students. This slowdown is expected to result primarily from a slower rate of growth in new medical schools, which have been organized at the rate of almost 3 per year since 1968.

Offsetting this trend to some extent are the growing number of programs for continuing medical education being offered by medical schools. These are designed as refresher courses for physicians and increasingly are being required by state licensing boards and accrediting bodies. It is expected that these programs will generate an additional teaching responsibility for

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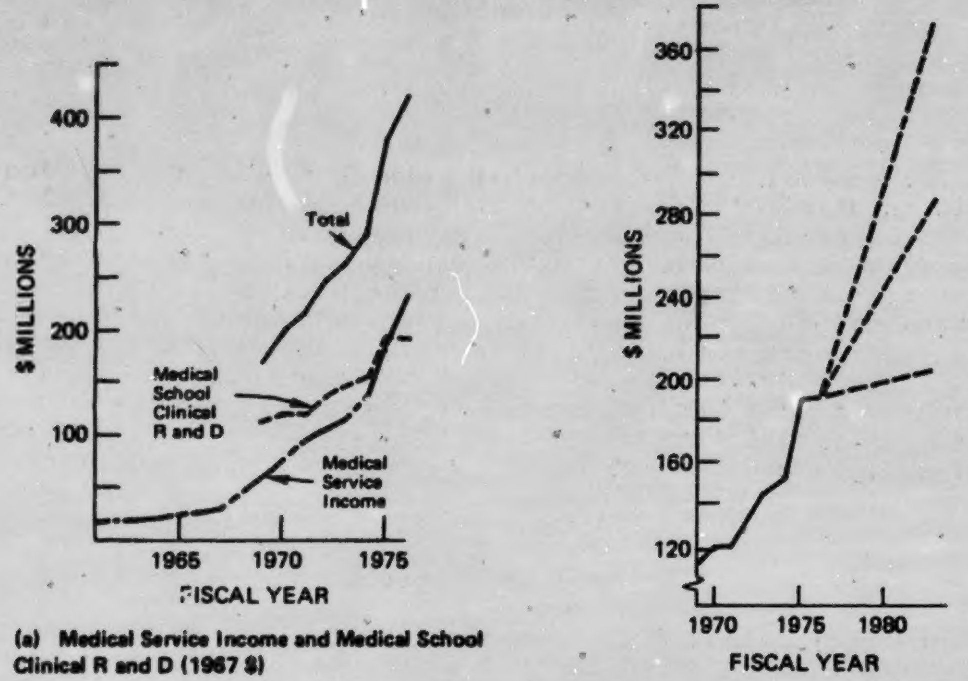
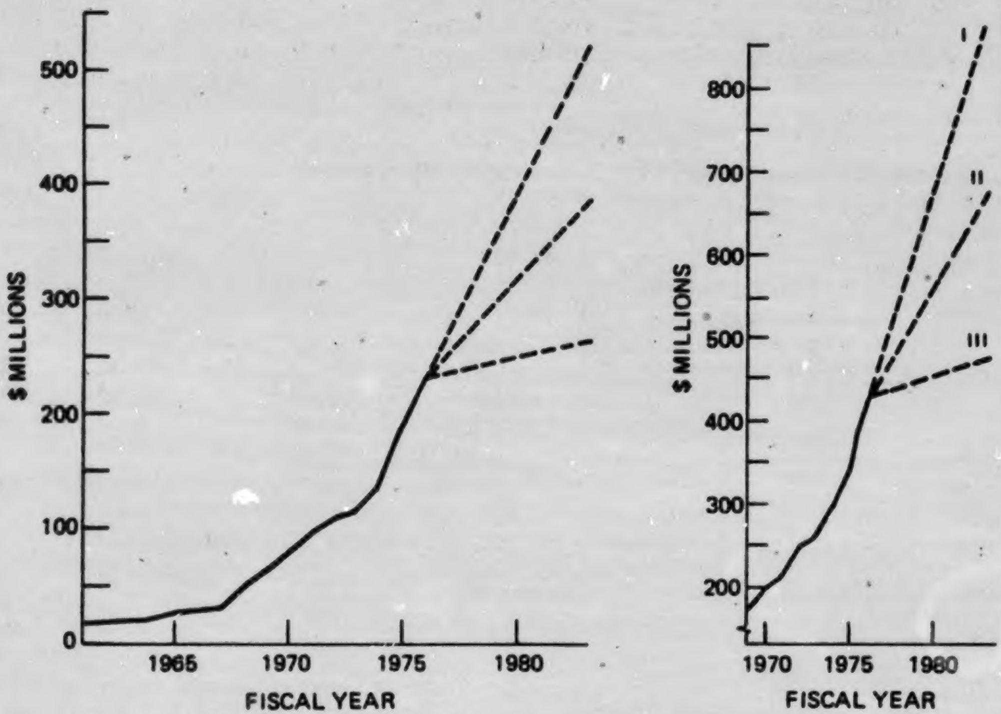


(a) Medical Service Income and Medical School Clinical R and D (1967 $)

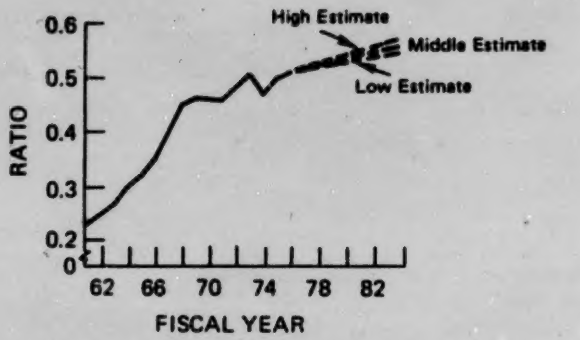
(b) Projected Medical School Clinical R and D (1967 $)



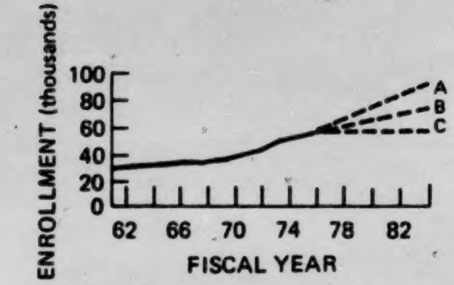
(c) Projected Medical Service Income (1967 $)

(d) Projected Total Medical School Clinical R and D and Medical Service Income (1967 $)

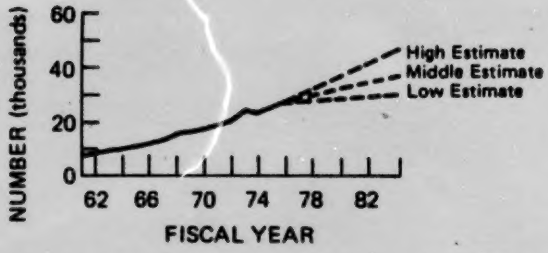
FIGURE 4.2 Medical service income and medical school R and D expenditures, 1961-76, with projections to 1983. Based on data from JAMA (1960-77).



(a) Clinical Faculty/Medical Student Ratio



(b) Medical Students



(c) Clinical Faculty in Medical Schools

FIGURE 4.3 Medical student enrollment and clinical faculty, 1961-76, with projections to 1983. Based on data from JAMA (1960-77).

TABLE 4.2 Projected Growth in Clinical Faculty, 1976-83, Based on Projections of Medical School Enrollment, Clinical R and D Expenditures, and Medical Service Income in Medical Schools[a]

Assumptions about Medical Student Enrollment		Assumptions about Real R and D Expenditures Plus Medical Service Income in Medical Schools I Will expand at about 11%/yr to $883 million in 1983	 II Will expand at about 7%/yr to $696 million in 1983	 III Will expand at about 2%/yr to $485 million in 1983
A. Will continue to grow at present rate (6%/yr), reaching 84,500 students by 1983	Expected size of clinical faculty in medical schools (CF) in 1983	47,256	46,606	45,365
	Annual growth rate in CF from 1976 to 1983	7.4%	7.2%	6.8%
	Average annual increment due to faculty expansion	2,665	2,572	2,395
	Annual replacement needs[b] due to death and retirement	493	489	481
	Expected total annual increment in clinical faculty	3,158	3,061	2,876
B. Will grow at 3%/yr reaching 69,200 medical students by 1983	Expected size of clinical faculty in medical schools (CF) in 1983	38,652	38,121	37,106
	Annual growth rate in CF from 1976 to 1983	4.4%	4.2%	3.8%
	Average annual increment due to faculty expansion	1,436	1,360	1,215
	Annual replacement needs[b] due to death and retirement	437	434	427
	Expected total annual increment in clinical faculty	1,873	1,794	1,642
C. Will show essentially no growth from 1976 to 1983, leveling off at 58,300 medical students	Expected size of clinical faculty in medical schools (CF) in 1983	32,558	32,110	31,255
	Annual growth rate in CF from 1976 to 1983	1.9%	1.7%	1.3%
	Average annual increment due to faculty expansion	565	501	379
	Annual replacement needs[b] due to death and retirement	398	395	389
	Expected total annual increment in clinical faculty	963	896	768

[a] These projections are based on the following relationship: $(CF/M)_t = \exp(-0.92982 - 75839.6/D_t) + 0.2$, where CF = size of clinical faculty in medical schools; M = medical student enrollment; D_t = a weighted average of the last 3 years of clinical R and D expenditures plus medical service income in medical schools, i.e., $D_t = \frac{1}{4}(D_t' + 2D_{t-1}' + D_{t-2}')$.

[b] Based on an estimated replacement rate of 1.3 percent annually due to death and retirement (Cartter, 1976, p. 121).

clinical faculty and ultimately will be reflected in additional positions in clinical departments.

Because of these factors, the Committee considers it possible, but not very likely, that medical school enrollment would continue to grow at the present rate of about 6 percent per year, reaching almost 85,000 students by 1983. It is also unlikely that medical school enrollment will stabilize at its current level of 58,000. These estimates appear to bracket the likely range of future enrollment patterns.

The effects of these projections on the demand for clinical faculty is shown in Table 4.2. Under the combination of highest assumptions (IA of Table 4.2) clinical faculty is expected to expand at over 7 percent per year from 1976 to 1983. This yields an estimated annual increment in clinical faculty of about 3,150 positions due to both expansion and replacement.

Under the middle set of assumptions (IIB), an estimated 1,800 new clinical faculty members would be needed each year to fill the positions created by expansion and replacement needs.

The combination of lowest assumptions (IIIC) result in only about 770 new positions created annually in clinical departments.

Supply of Clinical Investigators

On the supply side, a similar kind of shift in the sources of funds for training clinical investigators has been noted. Federal research training grants and fellowships, which for many years were the main source of research training funds in the biomedical and clinical science areas, have been declining. They are being replaced to a certain extent by funds from research grant and patient care activities. In a survey of 12 academic centers conducted for the Committee by the Association of the American Medical Colleges (AAMC) in 1977, it was found that in constant dollars, federal research training funds declined by 3 percent annually between 1972 and 1976, while funds available to support advanced clinical training from patient care activities and other sources increased by 13 percent annually. The net result for these 12 academic medical centers is that the proportion of all advanced clinical trainees who were receiving research training on a full-time basis declined from 49 percent in 1972 to 43 percent in 1976 (AAMC, 1978).

The Committee is also concerned over the long-term decline in the number of trainees with professional doctorates participating in the research training programs sponsored by NIH. From 1971 to 1976 this number dropped by more than 7 percent annually, from approximately 4,600 in 1971 to 1,800 in 1977 (NIH, 1966-78).

Training for Clinical Investigators

There are several possible explanations for the declining interest in research careers on the part of young physicians. To understand them, one must first understand the process by which a clinical investigator is trained and the factors that affect his or her career choice.

Clinical research has been regarded as primarily but not exclusively the province of the investigator with a professional degree. Knowledge of disease states and a background in patient care dispose the clinical scientist to raise questions different from those posed by a laboratory-trained scientist working in a clinical milieu, as well as to play a translating role in applying findings of laboratory and field research to problems of the patient. Moreover, the alert physician frequently provides the first essential clue as to new and unanticipated etiologic factors, adverse effects from therapeutic drugs and medical or surgical procedures, or hazardous agents in the environment. These clues can lead directly to specific hypotheses to be tested in epidemiologic studies. Indeed, the most productive clinical research is generally performed by investigators whose observations at the bedside or in the clinical laboratory have furnished the stimulus for their studies. Moreover, the investigator with a health professions background provides the role model essential for attracting students and house staff to research careers. Most clinical investigators have the M.D. degree or a comparable health professions doctorate. The curriculum of professional schools, however, provides little formal exposure to research during the predoctoral period. A notable exception is the combined M.D./Ph.D. program. After graduation from medical school, the new physician pursues several years of advanced clinical training. In some specialties, particularly the surgical areas, opportunities for research experience exist within the basic residency for specialty certification. In other specialties, however, there is little opportunity for research experience for trainees engaged in fulfilling residency requirements. At a relatively late point in his/her training career, the physician who is attracted to clinical investigation may finally consider research training. In most cases the individual has satisfied the requirements for primary board eligibility in a specialty. At this point there are several options: to enter practice, to continue training in a clinical specialty as a clinical fellow, or to pursue training as a research fellow.

Selection of the third option must frequently be made in the face of great uncertainty. The young physician selecting a postdoctoral fellowship does not know whether he/she will succeed in research. Also, there is a perception that established faculty members are encountering difficulty in obtaining support for their research. Lacking medical school research experience--largely a consequence of curricular revisions of the past decade--young trainees doubt their ability to compete with more accomplished investigators.

In addition, numerous financial and other disincentives impinge upon this career choice. What are some of these deterrents to the pursuit of clinical research training?

(1) Clinical research training competes with practice opportunities in which starting salaries of $40,000-$45,000 may not be unusual. At present the differential between a physician beginning a research fellowship and one beginning clinical practice may be $30,000 or more. The starting research training stipend is often less than the house officer's salary, which the fellow earned in the preceding year.

(2) The potential candidate for clinical research training often will still have debts from this lengthy educational process. Accumulated indebtedness at graduation from medical school in 1975 averaged almost $12,000, with 15 percent of the students reporting $20,000 or more in debts (HRA, 1977). This debt burden exacerbates over a trainee's lifetime the economic net loss that is associated with post-M.D. training for a career on a medical school faculty (Scheffler, 1975).

(3) As noted earlier, resident physicians have established their clinical ability, but must "gamble" on attaining equivalent competence in research. By accepting federal support for research training, the young physician becomes subject to the payback provision in the NRSA Act, even if he/she subsequently demonstrates a lack of talent for research.

(4) Program directors interviewed in the AAMC study felt that society has given indications that those pursuing careers of patient care are valued more highly than are teachers and researchers. For example, the federal government has initiated scholarship programs for those who will care for patients in medically underserved areas or in the military, but there have been moves to end support for research training. Federal research training awards pay less than clinical traineeships, and practitioners' earnings exceed those of faculty researchers.

(5) Testimony at public meetings held by the Committee has called attention to the probable effects of increased emphasis on the training of primary care physicians. From the time of entry into medical school, students are exposed to social pressure to pursue careers in direct patient care, particularly in

the primary care fields. But primary care physicians are less likely than clinical sub-specialists to retain an interest in research or to participate in research activities. Thus, these laudable social goals may have had an indirect effect on the career choice of medical students, reducing even further the small number with a potential interest in research and teaching.

(6) There is, too, a perception of growing administrative problems, paperwork, and restrictions peculiar to clinical research, such as regulations for the protection of human subjects and patients' access to records that may make clinical trials difficult to conduct. While none would question the important objectives of these rules, their existence undoubtedly adds to the increasing constraints on clinical research.

RECOMMENDATIONS

The projections of future demand suggest the need for an annual increment of approximately 1,800 persons to meet requirements created by expansion and attrition of clinical faculty in medical schools over the next few years (Table 4.2). In common with medical school faculty in the basic biomedical sciences, most of these additional clinical faculty will spend some portion of their time and effort in research activities in addition to their other academic responsibilities (teaching, service, and administration). The amount of effort actually devoted to research, per se, obviously will vary widely among all medical school faculty members.

Realization of this annual output of clinical faculty is in large part a function of the average length of postdoctoral training needed by clinical researchers. In determining an appropriate length of research training in the clinical disciplines, the Committee took as its model the experience of a typical "fellow"--a physician who has completed basic residency training and who then elects to continue in a postdoctoral program to acquire research skills and experience. In contrast to the Ph.D. who has received 4 to 7 years of rigorous predoctoral training in research, and frequently specialized postdoctoral training under an individual mentor, the typical M.D.'s initial research training usually occurs in the postdoctoral period. Accordingly, if M.D.'s (and other professional degree holders) are to become serious and productive research scientists, they in a sense need to be trained for a second career. The Committee believes, therefore, that under optimal circumstances, the average length of research training for M.D.'s should be from 3 to 4 years.

The Committee recognizes, however, that it is often impossible to realize the optimal length of research training and indeed that the more typical length of postdoctoral research training for clinical investigators, past and present, is from 2 to 3 years. In order that its recommendations strike a balance both between the desired optimum and actual experience, the Committee therefore postulates that the length of research training experience in the clinical disciplines is 3 years. Accordingly, in order to achieve an annual increment of 1,800 clinical faculty, the nationwide pool of postdoctoral research trainees in these disciplines would have to be approximately 5,400 (without making any allowances for attrition).

It should be emphasized that this total pool of postdoctoral trainees traditionally has been supported from multiple sources and that this practice will continue for the foreseeable future. Accordingly, it is necessary to develop a rationale for determining the proportion of this total number who should receive Federal support under the aegis of the NRSA Act. The Committee has considered the following two facts in determining this proportion:

1) The proportion of clinical research in colleges and universities supported by NIH was 44 percent in both 1975 and 1976 (NSF, 1975-77).

2) The federally supported portion of the total pool of clinical research trainees was about 67 percent in 1974-75 according to NIH and NSF.[2]

For purposes of its funding recommendation, the Committee has selected 50 percent of the total pool of 5,400 as the appropriate level of support under the NRSA Act. In arriving at a percentage somewhere between the two reference points, the Committee takes cognizance of the belief of many observers that clinical faculty on the whole are somewhat less likely than are basic science faculty to devote the majority of their time and effort to research pursuits. The Committee has no firm data with which to develop a precise estimate of the number of either basic science or clinical science medical school faculty whose other academic responsibilities predominate over their research endeavors. It is reasonable to assume, however, that the patient care responsibilities of most clinical faculty make it relatively more difficult for them to be as research-intensive as are most basic scientists. Accordingly, a 50 percent support level by the Federal Government for the clinical disciplines seems appropriate.

Supporting 50 percent of the total pool of postdoctoral clinical research trainees would amount to an annual NRSA support level of 2,700 individuals. It should be noted that while most such trainees are M.D.'s, there are also other doctorate holders in the pool, such as persons with D.V.M., D.D.S., and Ph.D.

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degrees. Also, to the extent that the demand estimated from the model described above does not take into account employment sites other than medical schools where federally sponsored clinical research is conducted (e.g., schools of dentistry and veterinary medicine, industry, and governmental and nonprofit laboratories), the estimated requirement for trainees is understated.

Thus, the Committee believes, on the basis of the information presently available, that its previous recommendation for federal support of 2,800 postdoctoral trainees and fellows in the clinical sciences is reasonable and should be continued. That recommendation was derived by applying, on the basis of professional judgment, a 10 percent increase to the number of trainees supported by the NIH in FY 1975. The derivation of a similar number through use of the more analytic approach outlined in this chapter is encouraging.

In last year's report the Committee had expressed concern that fewer than 2,800 trainees and fellows had been funded last year. The concern pertained mainly to the possibility that too few qualified persons were seeking research training because of low stipends and other deterrents. Available evidence, however, indicates that the FY 1977 shortfall was largely the result of budgetary limitations.

In reiterating its previous recommendation, the Committee is aware that the award of training positions cannot by itself counteract the slackening of interest in clinical research careers. The Committee will continue to assign high priority to a broad study of factors contributing to this problem of supply, as well as of possible actions needed to ensure an adequate pool of clinical researchers.

Recommendation. The Committee recommends that 2,800 postdoctoral training positions be made available in the clinical sciences for FY 1980 and should be maintained at this level until new information indicates the need for a change.

Medical Scientist Training Program

The Medical Scientist Training Program (MSTP) offers to carefully selected students an integrated program of medical and graduate training leading to the combined M.D. and Ph.D degrees. The great majority of graduates of these programs may be expected to pursue careers on medical school faculties. This expectation will be tested in the coming year by a follow-up study of the 53 graduates who are now 5 years or more beyond completion of the program.

In its 1977 report, the Committee recommended approximately 10 percent increases for both FY 1978 and FY 1979, using as a base the 600 MSTP training positions expected to be approved for FY 1977. The Committee continues to support the basic philosophy of this program and recommends that a modest increase in training positions be allocated to it.

Recommendation. The Committee recommends an increase in medical scientist trainees from 700 in 1979 to 725 in 1980, and that the program remain at that level through 1982.

RESEARCH AGENDA

To strengthen and improve the basis for its projections and recommendations on personnel in the clinical sciences, the Committee has identified issues and questions for which additional information is needed. Over the next several years, the Committee will seek to obtain this information through the research plan outlined below.

Supply of Clinical Researchers

One of the most pressing issues for which the Committee seeks data is the number of currently active clinical investigators. The Directory of Physicians, maintained by the AMA, is a data source for estimating the full-time equivalent of M.D.'s in research in all sectors. Since this file contains updated data on hours spent by physicians during a typical week on their various professional activities, it can provide an estimate for M.D.'s reporting research as their primary activity by type of practice, specialty, etc. Discussions are currently underway with the Association regarding data on the research involvement of all active physicians and of physicians employed as full-time faculty in medical schools. The tabulations will reflect changes in extent of research involvement that have occurred from 1968 to 1976.

Information is also being sought from the National Specialty Survey conducted by the Division of Research in Medical Education of the University of Southern California. These studies have determined by log diary the hours devoted by physicians to research. That information might provide a check on usefulness of the classification employed in the AMA Physician File. The data could reflect, for example, the actual extent of research involvement of physicians characterizing themselves as being primarily engaged in research.

The National Study of Internal Medicine, sponsored by the four constituent organizations of the Federated Council for

Internal Medicine Manpower, merits special attention because of its scope and special relevance to clinical research training. Precise data on the total number of clinical research fellows have been gathered from all of the subspecialty fellowship training programs in the United States. While the data are limited to internal medicine, that specialty includes a substantial majority of all post-residency clinical research trainees. In addition, that survey will provide information on the size and character of the non-NIH-supported segment of the training pipeline. The Committee therefore looks to the possibility of formulating general estimates from these data, based on the proportion of internal medical faculty to total medical school faculty.

The AAMC maintains a faculty roster that incorporates information on personal characteristics, educational experience, multiple patterns of activity, employment history, and current employment of faculty members. Data from this file will be used to determine trends in age distribution, mobility patterns, attrition, and changes in medical school faculty size.

Role of Non-M.D. Investigators

The discussion of clinical investigation presented earlier in this chapter focuses on the role of the researcher with a health professions doctorate in the conduct of clinical research. Nevertheless, there is evidence of an appreciable involvement of nonhealth professionals in the clinical sciences. Data from the NIH Manpower Survey[3] indicate, for example, that approximately 20 percent of the personnel employed as clinical scientists and receiving salary from NIH research grants for the 1973-75 period were Ph.D. holders. In the face of declining attractiveness of research careers for the health professional, it is probably unreasonable to expect that personnel needs in the clinical sciences can be met exclusively by investigators trained in the medical school/residency/research fellowship mode or in combined M.D./Ph.D. programs. In the Committee's view, the extent to which scientists with an academic doctorate can be used to supplement and enrich the supply of clinical investigators deserves the most careful study.

Dental Research Personnel

An ad hoc work group on dental research manpower needs was convened in May 1978 under the sponsorship of the Committee's Panel on Clinical Sciences. As a result of that meeting, staff of the Committee and the American Association for Dental Research will cooperate in mounting a national study to provide information on number and distribution of dental research personnel; types and duration of research training; areas of research interest and sources of research support; and characteristics of dentists electing research careers. In addition, the Committee has been invited to suggest modifications in the research section of the Survey of Dental Educators, which the American Association of Dental Schools uses for compiling an annual directory.

An effort will be made to define special characteristics of the dental research training system. One example is the link generally observed between research and clinical specialties, which creates special problems in the training of dental investigators. Whereas the young physician receives a salary during hospital residency training, salary payment for the newly graduated dentist is limited to hospital-based training in oral surgery. Advanced clinical training in the other specialties, which is generally carried out in dental schools, rarely provides compensation and, indeed, may require tuition payment. It seems clear therefore that NIH training programs for the D.D.S. investigator must continue to include support for a research-related clinical component. Moreover, because of this inclusion, the training period for the D.D.S. investigator will usually exceed the 3 year limit stipulated by the NRSA Act.

Attitudes of Students and House Staff

Data on attitudes of medical students will be examined. AAMC's Division of Student Studies initiated in March 1978 an annual survey of career determinants and preferences of graduating seniors in all U.S. medical schools. A pilot study involving 1,022 students in nine medical schools has been completed for 1976-77 academic year seniors. Research-related questions will cover plans for graduate medical education, such as intention to seek a research fellowship, as well as postgraduate career plans involving academic faculty appointments or employment as a salaried research scientist.

Plans are nearing completion for conducting a mail survey on attitudes of clinical fellows toward academic research careers. The purpose of the study would be to determine the range and extent of factors that may be influencing the career choice of the clinical fellow. The draft protocol calls for an incremental approach, the first phase of which would concentrate on "recent deciders" in the specialty of internal medicine. After validation of this approach, the study would be extended to other specialties, including those with relatively few clinical research trainees, such as obstetrics and gynecology. Depending on an appraisal of results, the survey instrument would then be modified for application to dentistry and veterinary medicine. The Committee believes that such a survey will be useful in helping to assess the relative weights to be assigned to various factors affecting the decision for or against an academic career.

Personnel Needs for Veterinary Scientists

Preliminary data on full-time equivalent veterinary personnel required for every $1 million of animal-related research supported by grants/contracts have been obtained through a survey of 11 research institutions. These data are intended for use in a model of demand for veterinary personnel being developed by the Committee's staff. During the coming year, efforts will be devoted to improving the methodology and to comparing the full-time equivalent D.V.M. personnel engaged in animal-related research with the number that the model suggests are needed. An ad hoc working group on veterinary research personnel is working with the Committee's Panel on Clinical Sciences to assess personnel needs in the industrial, governmental, and veterinary college sectors. Federal and state governments are major employers of D.V.M. scientists. Large numbers of such individuals participate in research at all levels at NIH, the Center for Disease Control, the Food and Drug Administration, the Environmental Protection Agency, the Department of Agriculture, the Department of Defense, state and county health departments, etc. The impact of federal policy in such areas as laboratory animal care, the Good Laboratory Practices regulations, water and air quality research, etc., is likely to create special demands for D.V.M. scientists in the near and long-term future.

FOOTNOTES

1. The demand model for clinical faculty in medical schools is specified to be of the following form:
$(CF/M)_t = \exp\,[\alpha - \beta/D_t] + K$, where $(CF/M)_t$ = ratio of clinical faculty in medical schools to medical student enrollment in year t; D_t = weighted sum of clinical R and D expenditures plus medical service income in medical schools (R'_t) in the last three years, i.e.:
$D_t = 1/4(R'_t + 2R'_{t-1} + R'_{t-2})$, 1967 \$, thousands.
α, β, K = constants to be determined empirically.

This functional form of the model specifies a growth curve which is asymptotic to e^{α} and has an intercept value of K when $D_t = 0$. Fitting this curve to the data for 1961-76 gives the following estimates for the parameters:

$\alpha = -0.93$
$\beta = 75840$
$K = 0.20$

2. Because of a lack of centralized record keeping and common nomenclature, it is extremely difficult to estimate the size of the pool of clinical research trainees in the United States for a particular year. Both the AAMC and NSF have attempted to derive such estimates, but there is considerable difference in their counts. The AAMC estimate for 1974-75 is approximately 2,700 postprofessional clinical research trainees (AAMC, 1978). This compares with an NSF estimate of 4,792 health sciences postdoctorals for the same year (NSF, 1973-77). Recent interviews with several respondents in the NSF survey indicate that these counts include some clinical fellows because of definitional problems and, hence, overstate the number engaged in clinical research training. The actual number of clinical research trainees for that year probably lies somewhere between the two estimates. If the mid-point between 2,700 and 4,800 is taken as the best estimate, we get 3,750 clinical research trainees in FY 1975. Accordingly, the 2,550 postdoctoral trainees and fellows supported by NIH represented 67 percent of the total for that year.

3. The NIH Manpower Survey has been conducted annually since 1973. It is directed toward the principal investigator on each research grant and is intended to obtain data on the personnel participating in these grants.

5. HEALTH SERVICES RESEARCH PERSONNEL

INTRODUCTION

Many consumers are puzzled by the persistent deficiencies in health services in the United States, given the fact that the nation now spends more than $160 billion each year on medical care (Millon, 1975; Enthoven, 1978a, b).

What is not immediately apparent to the casual observer is the fact that attempts to improve health services can give rise to new problems even as the old ones are being corrected.

The decision to extend the hours of an ambulatory care center, for example, may introduce temporary, new pressures in an otherwise smoothly functioning hospital. Assuming that sufficient resources are available, the hospital administrator may have to make adjustments in the distribution of staff, equipment, and support services to avoid problems in other parts of the hospital while improving ambulatory care.

Some attempts to improve health services give rise to problems so complex, however, that administrators must first understand the factors involved before further adjustments to the health system can be made. This is the domain of health services research (HSR).

Medical services, for example, have shifted over the years from the patient's home to the physician's office and, more recently, to hospital centers. While more patients now have access to the latest scientific and technological advances in the diagnosis and treatment of disease (e.g., mammography testing, genetic counseling, and imaged brain and body scans), the institutionalization and modernization of medical services has drastically altered the physician-patient relationship, the structure and function of hospitals and hospital administration, and the self-perceived role of the physician in these settings (Knowles, 1973; Millon, 1975).

The subtlety of these new problems has led to such diverse research as: studies of the social structure of the hospital, including physician-nurse interactions (Wilson, 1963; Stein, 1967); quantitative assessments of medical service utilization (Mechanic, 1976); and behavioral studies of the psychological needs of the hospitalized child (Johnson, et al., 1976) and the dying patient (Glaser, 1966; Benoliel, 1975).

The revolution in mental health care has also given rise to complex problems that will require more research in the coming years before further adjustments to the system can be made.

Widespread application of psychotropic drugs in the mid-1950's, for example, has since resulted in the release of over 1.5 million long-term residents from American mental institutions (Holden, 1978). "Community based care" is available instead on an out-patient basis through Community Mental Health Centers (CMHC's) or on an in-patient basis through nursing homes, boarding houses, residential hotels, or halfway houses scattered throughout the country (President's Commission on Mental Health, 1978, Volume II; Holden, 1978).

Only now, however, is the impact of deinstitutionalization beginning to be understood. A "stigma" continues to be attached to mentally and emotionally disabled people, resulting in community resistance to deinstitutionalization and in the "warehousing" of these former patients in certain urban programs (Research Task Panel on CMHC's Assessment, President's Commission on Mental Health, 1978). It is clear that research is needed on the mental health services needs of people who are underserved or inappropriately served at this time (President's Commission on Mental Health, 1978).

Health services research yields information about the organization of the health care system so that future attempts to make adjustments in the system will be based on informed judgments. It draws investigators from a variety of scientific disciplines who are familiar with the system under investigation by virtue of training or employment experiences.

For over 2 years the Committee has identified health services research as an emerging area of national need and has attempted to describe the importance of federal support for research training in this area so that more sensible allocations of our finite health resources can be made (NRC, 1975-77: 1977 report). However, the federal role in health services research training continues to remain unclear.

This is due in part to the fact that the field continues to face considerable skepticism among public officials and certain scientific groups (Lewis, 1977; Last, 1977; Mechanic, 1978) and, as a result, does not yet have a secure institutional base either in government or in the academic sector (Hamburg and Brown, 1978).

A number of federal initiatives currently pending, however, seem to indicate that the climate of support for health services research may be changing. In response to a request from the White House Office of Science and Technology Policy (OSTP), for example, the IOM is studying the organization and support of health services research,[1] the results of which will be available for review by the federal government later this year.

Despite these uncertainties, the Committee continues to believe that federal support of training in health services research is amply justified by national needs for a better understanding of the forces affecting the delivery of health care to the population. The Committee therefore reiterates its recommendations for fellowship and traineeship support under the NRSA authority with the hope that a favorable climate for health

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services research will result eventually in the implementation of the recommendations developed by this Committee.

DEFINITION OF HEALTH SERVICES RESEARCH AND TRAINING

Federal support of health services research is based on the policymakers' concepts of the field, which vary in specificity with the policy issue being decided. In expanding earlier definitions for use in this report, the Committee and its Panel on Health Services Research have tried to make a clear statement which is broad enough to encompass the various health systems studied by HSR personnel.

The Committee recognizes that there is no universally accepted definition of HSR (Myer, 1973; Rein and White, 1977; Mechanic, 1978) and has chosen the following statement to guide its deliberations:

> Health services research is theoretical or applied research which examines the organization and performance of health care delivery systems and makes possible informed health care policy. It is a distinct area of inquiry in which systematic methods are applied to problems of the allocation of finite health resources and the improvement of personal health care services.

Health services research is most properly understood to be a problem area taken up by an investigator trained in a basic science discipline. In its last report, the Committee introduced the idea that HSR training can also be most easily understood if a two-dimenstional matrix is adopted in which one dimension represents the traditional discipline in which an HSR investigator has been trained. These include: 1) the behavioral sciences (anthropology, sociology, and psychology); 2) the social sciences (economics and political science); 3) the biomedical sciences (biostatistics, bioengineering, and epidemiology); 4) public health; and 5) such other fields as operations research, health administration, public administration, and health education.

The major problem areas, which comprise the second dimension, fall into seven categories: 1) studies of health personnel; 2) studies of various services including mental health and substance abuse programs; 3) economic studies; 4) studies of the quality of care; 5) legal studies; 6) behavioral and social studies of the individual or the community; and 7) innovative studies of health services design, including technology transfer.

Figure 5.1 displays the two-dimensional matrix that has been developed. The Committee believes that this classification system has great potential throughout the federal government and in other public and private sectors to identify and support HSR and HSR training in the coming years.

Occasionally, health services research has been distinguished from other health research on the basis of its relationship to other health sciences. The following model invokes the concept of a continuum of health sciences:

> At one end of this spectrum is basic research, usually laboratory-based, which is typically initiated by an investigator with no particular treatment or prevention goal in mind. Next on the continuum are small-scale clinical investigations on a few patients and then large-scale controlled field trials (involving hundreds or thousands of individuals) that typically seek to delineate the effects of particular interventions or risk factors in human health. At the far end of the research continuum are health services research, concerned with the practical problems arising in the provision of health care, and prevention research which explores strategies to prevent disease in the first place (Hamburg and Brown, 1978).

It is convenient to classify health services research along a hypothetical health sciences spectrum such as that described above. However, this unidimensional display may leave the misleading impression that health services research is an "applied" activity distinctly unlike the activities that comprise the other, more basic, sciences.

In actual fact, health services research does include fundamental inquiry, often using the experimental methods developed by the social and behavioral sciences. This distinction is important not only for the support of health services research, but also for the ultimate acceptance of health services research training in the academic community.

What distinguishes HSR psychology doctoral students, for example, from non-HSR peers may simply be the problem area taken up for dissertation study.

The Committee and its Panel on Health Services Research have concluded that it is important to list the range of research approaches used by health services research personnel so that the work of these investigators is understood to parallel that of other scientists:

	Major Research Problem Areas							
Primary Disciplins of Research Training	Health Personnel Mental Health Personnel	Ambulatory Care Child Health Services Dental Health Services Emergency Health Services Health Services for the Disadvantaged Indian Health Services Long-term Care Nursing Health Services Pharmacy-related Health Services Rural Health Care Services Mental Health Services Drug Abuse Prevention Programs Alcoholism Prevention Programs	Inflation and Cost Containment Health Insurance	Quality Assurance Health Facilities	Legal Aspects of Health Care Health Politics	Community Studies Health Education Sociobehavioral Aspects of Health Care	Health Services Design and Development (including technology transfer)	Other
Behavioral sciences Anthropology Sociology Psychology								
Social sciences Economics Political science								
Biomedical sciences Biostatistics Bioengineering Epidemiology								
Public health								
Other fields Operations research Health administration Health education Public administration								

Figure 5.1 Primary disciplines of health services research training and major research problem areas.

Primary Research Approaches of Health Services Research Personnel

Health statistics
Statistical indicators
 (including health status
 indicators)
Computer models

Case studies
Clinical studies
Social experimentation
Survey research

Evaluation research
 (including program
 evaluation)
Technology assessment

Decision analysis
Policy analysis

In summary, health services research is a distinct area of scientific inquiry that examines health systems to make information available for future adjustments to the system. It draws scientists from a variety of backgrounds who are distinguishable from their colleagues chiefly on the basis of the problem they elect to study--namely, the health care system. While health services research may be understood to occupy a unique place among the health sciences, its research methods are similar to many basic sciences.

CURRENT FEDERAL EFFORTS IN HEALTH SERVICES RESEARCH TRAINING

Using the operational definition of health services research training given above, the Committee has reviewed the training programs of a number of federal agencies.

NRSA Authority

NIH. The basic mission of NIH is to "advance the Nation's capability for the prevention, diagnosis and treatment of disease through biomedical research" (NIH, 1976a).

As the interests and responsibilities of the 12 component institutes have broadened to include activities that transfer and disseminate biomedical research findings, health services research has been supported as part of other NIH clinical research endeavors. In recent years, for example, NIGMS has supported research on the social and legal problems of human genetics research, including the impact of genetic screening (NIH, 1976a). Similarly, the National Heart, Lung and Blood Institute has begun to support studies that explore different models of service delivery to reduce cardiovascular risk and to control hypertension, obesity, and smoking (Evans, 1978).

While the Committee acknowledges that the NIH provides some support for health services research, it has been unable to demonstrate support for HSR training by NIH under the NRSA authority.

Although NIH sponsors research training in basic fields related to HSR, such as biostatistics, epidemiology, and public health, a review of the NRSA training grants currently supported under the NRSA authority led the Committee to conclude that these programs do not fit within the definition of HSR training developed in this report. Hence, recommendations for research training in these fields have been developed by the Panel on the Basic Biomedical Sciences (Chapter 2).

It may be possible that HSR training is indeed provided at some institutions receiving NRSA support from NIH in these areas. However, it is not evident from the data provided by the agency.

The Committee and its Panel on Health Services Research would find it helpful if the NIH would use the two-dimensional system described earlier in this chapter when collecting information about their NRSA programs. This system would permit the recognition of any formal health services research training that may be supported by the various institutes, and would permit the development of appropriate recommendations for research training support.

ADAMHA. Since the enactment of the NRSA Act in 1974, the research training programs of ADAMHA have included opportunities for mental health services research evaluation training.

The mental health services training programs are an important outgrowth of the evaluation training programs offered in the social sciences division of the NIMH since the late 1960's and seek to develop a "pool of highly qualified researchers trained to develop, apply and refine appropriate scientific methodologies for the study of problems related to the delivery of mental health systems "(Appendix B 3.1 and 3.2).

HSR training opportunities are also provided to study health care delivery systems in the field of alcoholism and drug abuse and preventive and rehabilitative services in this area.

As part of its 1978 report, the President's Commission on Mental Health outlined a national plan to meet the needs of people with chronic mental illness. As a first step in implementing the plan the Commission recommended that the Department of Health, Education, and Welfare, in consultation with state and local governments, develop a national plan for:

a) the continued phasing down, and where appropriate, closing of large state mental hospitals;

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b) the upgrading of service quality in those state hospitals that remain; and

c) the allocating of increased resources for the development of comprehensive, integrated systems of care that include community-based services and the remaining smaller state hospitals.

If implemented, these recommendations suggest a continued prominent role for HSR and HSR training in ADAMHA.

Division of Nursing. The Committee notes that the HRA Division of Nursing supports nursing health services research, and urges that the number of awards for training in nursing health services research be increased.

The Committee notes that of the 120 approved NRSA fellowship applications in FY 1977, only 4 were approved for health services research training (Gortner and Bourgeois, 1978). Because of the increasingly prominent role nursing services play in the delivery of health care, the need continues for available skilled personnel whose professional training prepares them to conduct research relevant to the improvement of the nursing health services.

Other Federal Efforts

In addition to the HSR training opportunities offered under the auspices of the NRSA authority, HSR training support has been identified in a few other federal agencies.

The Veterans Administration (VA), for example, has a program to train HSR personnel for research pertinent to improvement of VA health services. Twenty individuals presently receive such support through the general education authority of the VA.[2]

The Health Services Research, Health Statistics and Medical Libraries Act of 1974 (PL 93-353)[3] authorizes intramural and extramural HSR training authority for the NCHSR, although lack of funding since FY 1973 has virtually eliminated this program of research training even though the training authority continues.[4]

This review of HSR programs may not be complete if opportunities for HSR training are available in other federal agencies not yet examined by the Committee, such as the Health Care Financing Administration (HCFA). In the coming year the Committee and its Panel on Health Services Research will study this further.

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FINDINGS FROM THE INVITATIONAL CONFERENCE ON HEALTH SERVICES RESEARCH PERSONNEL

In its 1977 report, the Committee provided findings from its survey of 500 individuals who had once received support for HSR training.[5] Over 65 percent of the former trainees responded, with 80 percent of those indicating that they conducted health services research at the time of the survey, October 1976. The results led the Committee to conclude that current employment conditions for these HSR personnel were "good" (NRC, 1975-77: 1977 report).

Because it has been difficult to develop a statistical base from which market estimates could be made for health services researchers, the Committee took a new approach to labor market discussion. Together with its Panel on Health Services Research, the Committee convened a 1-day Invitational Conference on Health Services Research Personnel (Appendix C) which brought together representatives from public and private organizations that employ and/or train HSR personnel.[6] Discussions focused on four major areas of concern:

- How many people are engaged in health services research? How large is the pool of available HSR personnel?
- What creates the demand for HSR personnel? What is the current demand? Is this expected to change?
- What attracts people to careers in health services research?
- How has declining federal support in health services research training through NCHSR affected the institutional training environment?

Estimating the Number of HSR Personnel

Any study that attempts to guide federal policies for research training support on the basis of market descriptions requires such minimum information as the estimated number of investigators in the U.S. labor force in a given year.[7] Because of the peculiar way in which health services research personnel are identified, however, the Committee believes that an estimate of the pool of these scientists will not be readily forthcoming, if it can be achieved at all. As a result it will be necessary to develop alternative approaches to labor force discussions in this area.

As the definition introduced earlier in the chapter suggests, HSR personnel are trained in a basic science discipline while they apply their research skills to some aspects of the health system. The identification of these personnel is hampered by the fact that most statistical data sources estimate the number of scientists in a given field on the basis of their main field of training (e.g., the Doctorate Record File) or their main field of employment (e.g., the Comprehensive Employment Roster). No data base exists that collects information on the number of doctoral scientists who conduct health services research as their primary specialty area.

Earlier in the chapter the Committee identified a number of disciplines that typically represent fields in which HSR may be trained, such as anthropology, biostatistics, or public health. It would be a gross error to use the estimated number of doctoral scientists in each discipline in a particular year as an estimate of the pool of available HSR personnel, since health services research personnel differ from their discipline colleagues in their familiarity with the operation of the various health care systems.

For over 2 years the Committee has worked closely with representatives from the NCHSR and ADAMHA in developing a statistical data base that would begin to describe the number of doctorally trained scientists who conduct health services research. Over 1,700 individuals have been identified thus far as once having received support from the NCHSR as principal investigators on health services research grants or contracts or as having received federal funds from the NCHSR or ADAMHA to train in health services research. An extension of the preliminary survey of these personnel reported by the Committee last year is being conducted at this time and should be useful in describing the current research activities of these personnel.

While the survey responses of past recipients of federal support should be a first important step in estimating the number of available HSR in the U.S. doctoral labor force, it is uncertain at this point how much further statistical analysis can be achieved. Other approaches to describing the pool of these investigators will be examined by the Committee in the coming year.

Estimating Employment Opportunities in HSR

In recent years, opportunities for employment in health services research have become explicit as research and evaluation personnel have been sought by CMHC's, the VA, Health Systems Agencies (HSA's), and state and local departments of health. Academically affiliated Centers for Health Services Research have been established at eight institutions in recent years, and it is clear that they will serve as both "users" and "producers" of HSR personnel.[8] Finally, for profit research firms and third party payors have created job categories which, at least implicitly, suggest another market for HSR personnel.

At the HSR Invitational Conference, every representative from the public sector described multiple statutory requirements to conduct health services research that cannot be fulfilled without increased numbers of personnel who are familiar with the structure and operation of the health system to be studied. In some instances, where funds are available for hiring HSR personnel, such personnel have had to be trained on the job, often retarding completion of the research task within the time required.

According to several conference participants, the market for mental health services research personnel in particular is "booming" and may be expected to continue to expand following the release of the report by the President's Commission on Mental Health.[9] Mental health services research, it must be added, further requires familiarity with human services delivery systems, narrowing employment opportunities further to those with relevant training.

On the whole, public sector employment in health services research revealed a shortage of personnel with the skills necessary to take up legally mandated assessments of the health system in question, whether CMHC's, HSA's, or VA hospitals.

Representatives from the private sector[10] indicated that employment opportunities in health services research were directly related to the funds available from government and other sources to conduct this research. At the present time employment conditions appear to be in equilibrium.

In summary, the findings from the Invitational Conference on HSR Personnel convened by the Committee reveal that these investigators are being sought by a variety of employers. Furthermore, while on-the-job training has been provided in certain instances, it was not the preferred approach to hiring investigators by the majority of employers who participated in the conference.

Impact of Lost Training Grant Support

A number of conference participants once received institutional training grant support from the National Center for Health Services Research to provide HSR training. Withdrawal of support from the academic sector by the federal government in recent years was described as having a profound effect on the research training environment.

Among the consequences of lost training grant support cited by conferees were reductions in enrollments and quality of students; a greater number of part-time students; absence of travel funds to bring speakers to campus and to provide students with important, off-campus experiences with local health care delivery systems; and lack of funds to buy important support services, such as computer center services, and to hire support staff.[11]

Some program directors have been able to supplement lost training grant support with research assistantships for their students. However, this appears to vary from institution to institution.

In contrast to the loss of training grant support for noncategorical HSR training, representatives from mental health services research enjoy a favorable climate for support under the auspices of the NRSA authority. Some noted a proliferation of institutional sites that provide interdisciplinary training in this area as a result of increased funding.[12]

In summary, it appears that the availability of NRSA support for training in mental health services research has resulted in expansion of the sites engaged in mental health services research training. In contrast, the dramatic reduction in federal support of HSR training through the NCHSR is beginning to be felt by those institutions that once provided such training. While some departments, especially in the behavioral sciences, have been able to shift to NRSA support by shifting training to mental health services delivery questions, this appears to be the exception rather than the rule.

RECOMMENDATIONS

Predoctoral/Postdoctoral Training

The Committee recognizes that ADAMHA plays a crucial role in delivering mental health and related services to the nation. Joining with the President's Commission on Mental Health, the Committee calls for a renewed emphasis on mental health services research relevant to the design and evaluation of these services (President's Commission on Mental Health, 1978).

At the present time the Community Mental Health Centers Act of 1975 requires the preparation of statewide and regional mental health plans for the purposes of improving the quality of mental health care through this federally subsidized system. Recognizing that poor planning can "confuse priorities, divert administrative energies and waste money," the President's Commission on Mental Health recommended that:

> The National Institute of Mental Health allocate to a selected number of programs an award of 10 percent in excess of their

> grant for the purpose of developing and assessing techniques to evaluate mental health service delivery.

This recommendation must be applauded, given the urgent need to improve the quality of mental health and substance abuse services in this country. However, the Committee would like to stress that more funds for research in this area can only be effective if there is a larger pool of investigators who are familiar with the services to be evaluated.

In view of these needs, the expansion of HSR training programs by ADAMHA should be continued. The Committee notes, however, that funding has remained level in this area in recent years (Table 5.1) and urges ADAMHA to expand its program of HSR support at a rate of 10 percent per year from the level reported in FY 1976. This recommended rate of expansion is based on current perceptions of the rate at which institutions can develop appropriate HSR training programs in this area, given current levels of NRSA support.

Careful monitoring of the development of research capabilities in this area will be required so that suitable adjustments to this recommendation can be made.

Recommendation. The Committee reaffirms its recommendation that ADAMHA expand its program of HSR training at a rate of 10 percent per year based on FY 1976 levels of support through FY 1982.

The HSR training programs of ADAMHA, the Division of Nursing, and the VA focus on training in problem areas relevant to the health system in which the training is conducted. Hence, this training prepares specialists for employment in such specific locations as CMHC's or the VA hospital, where the special area of expertise can be used.

Based on the HSR Conference discussions, these training programs do not appear to satisfy the need for research personnel familiar with the medical and other services monitored by such planning agencies as the HSA.

Because the Committee considers the NRSA authority to be appropriate for supporting investigators whose HSR expertise goes beyond mental health services and nursing health services research, the Committee urges that a program of general health services research training be established. Such a program would assure the production of investigators to take up the research and evaluation required by a variety of federal laws, investi-

TABLE 5.1 Committee Recommendations for ADAMHA Predoctoral and Postdoctoral Awards in Health Services Research

Agency Awards and Committee Recommendations	Fiscal Year							
	1975	1976	1977	1978	1979	1980	1981	1982
Actual awards								
Total	*183*	*191*	*144*					
Pre	*132*	*121*	*79*					
Post	*51*	*70*	*65*					
1976 recommendations								
Total		185	210	230				
Pre		135	120	135				
Post		50	90	95				
1977 recommendations								
Total					250	275	300	
Pre					145	160	175	
Post					105	115	125	
1978 recommendations								
Total						275	300	330
Pre						160	175	190
Post						115	125	140

gators who appear to be in short supply at this time according to conference participants.

Recommendation. The Committee recommends that a program of general health services research training be established under the NRSA authority.

Traineeships/Fellowships

The institutional training grant, which permits the development of innovative interdisciplinary research training programs while it strengthens the research setting, is viewed as the preferred mechanism of support in this emerging research area.

The Committee notes that in FY 1976 the number of traineeships provided by ADAMHA for health services research training surpassed the number of fellowships at a ratio of almost 18 traineeships for every fellowship, (Chapter 1, Table 1.1).

The research training fellowship also plays a role, although it is more limited, in health services research training. The talented investigator who has interest in pursuing a course of health services research training is provided the opportunity to seek such training with a particular investigator or at an institution where a critical mass of investigators may be working on the types of problems of interest to the fellow.

The Committee views this mechanism of support to be suitable primarily for postdoctoral research training, since the availability of fellowship support may encourage individuals with some experience in the area of health care policy to pursue advanced training.

Recommendations. The Committee recommends that traineeships represent no less than 75 percent of the total number of awards for health services research training. The majority of traineeships should be used to support predoctoral research training.

The majority of fellowships should be awarded for postdoctoral training.

Midcareer Research Training

Many health services research personnel today are individuals who have been trained in a basic science field or health profession but who have had little or no formal training in health services research. While continued emphasis ought to be placed on the development of HSR training programs for predoctoral and postdoctoral training, a program of midcareer research training in health services research might provide an important opportunity for employed health services research personnel to obtain formal training.

If the funding level were adequate, a program of support for midcareer research training could attract physicians with experiences as providers in the health care system, academic doctorates whose research interest have shifted to questions of health care, and nondoctorates who desire to acquire through formal training, research skills and advanced techniques in health services research.

Midcareer research training might be provided through short, summer courses on methodologies relevant to health services research. It might also include academic training for 1 year during "sabbatical leave," or as much as 2 years of work as a postdoctoral appointee in a manner similar to the Robert Wood Johnson Clinical Scholars Program (Beck and Smith, 1978).

The Committee will explore possible roles for NRSA support for midcareer research training in health services research in the coming year.

FOOTNOTES

1. Thomas Bice, in a statement before the NRC Panel on Health Services Research, January 20, 1978, Washington D.C. The Committee has established informal liaison with the IOM Committee to discuss areas of common concern.

2. Carleton Evans, VA, NRC Invitational Conference on HSR Personnel, May 17, 1978.

3. The Act also provides the National Library of Medicine with the authority for research training in information systems design and development, which undergirds medical record keeping today.

4. All that remains of this once active research training effort is a small research grant program for dissertation study that provides funds to doctoral students whose research is related to the improvement of health care.

5. These individuals received predoctoral or postdoctoral research training support some time after FY 1970 from the NCHSR or since FY 1975 from ADAMHA.

6. The May 17 NRC Invitational Conference on HSR Personnel included participants listed in Appendix C as well as observers from such organizations as the American Psychological Association, the Pan American Health Organization, NIH, NCHSR, and the private sector.

7. See the market projections, for example, found in Chapters 2, 3, and 4.

8. Sam Shapiro, The Johns Hopkins University, NRC Invitational Conference on Health Services Research Personnel, May 17, 1978.

9. P. Wortman, Northwestern University, and W. Goldman, San Francisco Community Mental Health Services, NRC Invitational Conference on Health Services Research Personnel, May 17, 1978.

10. These included representatives from the Rand Corporation and the Blue Cross/Blue Shield Association.

11. Robert Eichhorn, Purdue University and Barbara Starfield, The John Hopkins University, NRC Invitational Conference on Health Services Research Personnel, May 17, 1978.

12. P. Wortman, NRC Invitational Conference on Health Services Research Personnel, _op_. _cit_.

6. NURSING RESEARCH PERSONNEL

INTRODUCTION

In its 1977 report, the Committee made its initial recommendations concerning the direction the HRA's Division of Nursing should take in developing its program of NRSA support.[1]

Recognizing nursing research to be a distinct area of scientific inquiry, the Committee defined nursing research as follows:

> Nursing research focuses on the role of nursing care in the prevention of illness, care of the sick, and the promotion and restoration of health. Although it relies upon and utilizes the substantive scientific information and methodology provided by the other biological and behavioral sciences, it differs from those other scientific areas in that it focuses on their relevance to nursing rather than other aspects of health care. (NRC, 1975-77: 1977 report, p. 152)

The Committee devoted much of its assessment in that report to a review of those trends in nursing research that have given rise to the emergence of an interest in and need for doctoral education in this health profession. Findings from a survey of 500 nurses who had completed their doctoral training between 1971 and 1975 were reported. These findings led the Committee to conclude that the market for doctorally trained nurses is quite large, and that the obvious demand for teachers and researchers with graduate training "makes it likely that training funds could be productively used for the next several years on an expanding basis" (NRC, 1975-77: 1977 report).

Because the extension of the NRSA authority in 1976 to include the Division of Nursing actually revitalized a program of research training that then was providing support for 35 individuals (NRC, 1975-77: 1977 report), the Committee's recommendations had to address, in part, changes in research training emphasis, given the thrust of the new training authority.

Specifically, the Committee noted that predoctoral research training continued to be the appropriate level of training to meet the urgent need for doctorally trained individuals capable of providing research and teaching leadership. Whereas past training opportunities provided by the Division of Nursing almost exclusively resulted in predoctoral support (Bourgeois, 1975), the Committee proposed that up to 15 percent of the total number of awards could be made at the postdoctoral level as "properly qualified candidates present themselves" (NRC, 1975-77: 1977 report). Opportunity for postdoctoral training was considered appropriate by the Committee, since nurses who had completed their doctoral training in prior years might wish to update their research skills to keep up with recent advances in nursing research.

The Committee also called for a significant reorientation of the program of fellowship support. It was noted that fellowship support in the past had been used for doctoral training in such fields as education and administration, as well as in the biological and behavioral sciences. The Committee recommended a substantial reduction in the number of fellowships for study in nonscience departments and emphasized that training under the NRSA authority should be in research and not in professional fields.

The Committee recommended an expansion of institutional training awards to permit the development of nursing research through interdisciplinary training and recommended such grants be given to schools of nursing to establish programs for nurses in cooperation with university departments in the biological, physical, or behavioral sciences. Similar to the Nurse Scientist Training Program of 1960's (Matarazzo, 1971), these institutional arrangements would give traineeships to nurses for study in basic science departments that had established relationships with schools of nursing, although the details of this approach would have to be developed to meet the provisions of the NRSA authority.[2]

The Committee also recommended that a few institutional awards be made available for training in graduate departments in well-qualified schools of nursing. Recognizing the advances that have been made in nursing research in recent years, the Committee suggested that a few nursing faculty might provide quality training in nursing research under the auspices of the NRSA authority.

Given the innovative thrust of these recommendations, the Committee set as its goals for this report a review of the NRSA program development by the Division of Nursing. A summary of the recent developments in doctoral training opportunities in nursing research is also provided.

The Committee acknowledges the valuable contributions made by the representatives of the nursing community who provided information to the Committee either at its public meeting convened earlier this year or through private communications. These observations have greatly assisted the Committee in its deliberations.

Findings from the NRC Surveys of Doctoral and Pending Doctoral Programs for Nurses are also presented in this report.

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This series of interviews and site visits has provided the Committee with important information regarding the current climate for research training in schools of nursing.

TRENDS IN DOCTORAL EDUCATION FOR NURSES

Today there are over 1,400 programs in the United States offering training for registered nursing. Of these, more than 350 offer a nursing diploma after training at a hospital, about 640 offer an associate of arts degree after coursework in a community or junior college, and about 340 offer a baccalaureate or higher degree. In addition, there are over 100 nursing programs that offer a masters degree and 16 that offer the doctorate (National League for Nursing, 1977a and b).

The changing status of doctoral education in nursing is evident not only in the proliferation of doctoral programs in schools of nursing in recent years (Leininger, 1976) but also in the fact that nearly half of the 1,800 nurses with doctoral training earned these degrees some time in the last decade.

Doctoral programs have been established in schools of nursing in response to a variety of local as well as national needs. Because the Committee's recommendations for NRSA program development are based on the demand for doctorally trained personnel, the following review of doctoral programs in nursing serves as a useful background to the survey findings subsequently reported in this chapter.

At the present time nursing education is influenced by the presence of four major regional education authorities. These include:

- the New England Board of Higher Education (NEBHE), established in 1955 by formal agreement among six member states (Connecticut, Maine, Massachusetts, New Hampshire, Rhode Island, and Vermont);
- the Southern Regional Education Board (SREB) formed in 1948 for regional planning among the following 14 member states: Alabama, Arkansas, Florida, Georgia, Kentucky, Louisiana, Maryland, Mississippi, North and South Carolina, Tennessee, Texas, Virginia, and West Virginia;
- the Western Interstate Commission for Higher Education (WICHE), formed most recently (1955) to coordinate educational planning among 13 member states (Alaska, Arizona, California, Colorado, Hawaii, Idaho, Montana, Nevada, New Mexico, Oregon, Utah, Washington, and Wyoming).

- the Committee on Institutional Cooperation (CIC), formed in 1962 in the Midwest to coordinate educational planning and resources among the "Big Ten" universities. (At the present time a feasibility study is under way to develop a Midwest Alliance which would encompass 13 midwestern states, thereby expanding the planning endeavors in the greater Midwest region).

These regional planning boards have played an important role in identifying the needs and resources in schools of nursing, in promoting research through the availability of "seed money", and in helping institutions study problems in nursing education that might require interstate assessments (NEBHE, 1975; SREB, 1975; CIC, 1976; WCHEN, 1975).

As data from the Survey of Doctoral and Pending Doctoral Programs for Nurses reveal, the availability of regional coordinating authorities has determined to some extent the location and emphasis of doctoral programs for nurses.

FINDINGS FROM THE SURVEYS OF DOCTORAL AND PENDING DOCTORAL PROGRAMS FOR NURSES

As a part of the continuing effort to provide the Committee with information describing developments in graduate education for nurses, the Ad Hoc Advisory Group on Nursing Research Personnel conducted two surveys of a selected number of schools of nursing which either provide doctoral programs for nurses, or are developing doctoral programs at this time. Site visit interviews with the deans were arranged to gain a better understanding of the factors influencing the development of the programs at the institutions surveyed.

As of October 1977, 16 schools of nursing offered doctorates (Table 6.1 and Figure 6.1). Because it was not feasible to visit all doctoral program sites, 10 were chosen (Table 6.2). These varied with respect to type of degree offered, age/size of the program, and regional location.

The Ad Hoc Advisory Group also identified five institutions where preparations to initiate doctoral programs were under way (Table 6.2).

The questionnaire developed for the Survey of Doctoral Programs for Nurses (Appendix I) sought information in four categories: graduate program development (including enrollments, number of degrees awarded, and criteria for admission); sources of doctoral/postdoctoral support for training; faculty characteristics; and amount and type of research activities by the faculty. A similar form was developed for the Survey for Pending Doctoral Programs for Nurses (Appendix I).

TABLE 6.1 Schools of Nursing with Doctoral Programs, 1977-78[a]

Location	Institution
Alabama (Birmingham)	University of Alabama
Arizona (Tucson)	University of Arizona
California (San Francisco)	University of California, San Francisco
Washington, D.C.	Catholic University
Illinois (Chicago)	Rush University
	University of Illinois, Chicago
Massachusetts	Boston University
Michigan (Ann Arbor)	University of Michigan
(Detroit)	Wayne State University
New York	New York University
	Columbia, Teachers University
Ohio (Cleveland)	Case Western Reserve University
Pennsylvania	University of Pittsburgh
Texas (Denton)	Texas Woman's College
(Austin)	University of Texas, Austin
Utah (Salt Lake City)	University of Utah

[a] From National League for Nursing (1977a).

TABLE 6.2 Selected Schools of Nursing with Doctoral or Pending Doctoral Programs

Location	Institution	Type of Degree Offered
Alabama (Birmingham)	University of Alabama	D.S.N.
Arizona (Tempe)	Arizona State University (pilot study site)	Ph.D. (pending)
Arizona (Tucson)	University of Arizona	Ph.D.
California (San Francisco)	University of California, San Francisco	D.N.S.
Colorado (Denver)	University of Colorado	Ph.D. (pending)
Illinois (Chicago)	University of Illinois, Chicago	Ph.D.
Michigan (Ann Arbor)	University of Michigan	Ph.D.
Michigan (Detroit)	Wayne State University	Ph.D.
New York (New York City)	New York University (pilot study site)	Ph.D.
New York (Rochester)	University of Rochester	Ph.D. (pending)
Ohio (Cleveland)	Case Western Reserve University	Ph.D.
Pennsylvania (Philadelphia)	University of Pennsylvania	D.N.Sc. (pending)
Texas (Austin)	University of Texas, Austin	Ph.D.
Utah (Salt Lake City)	University of Utah	Ph.D.
Washington (Seattle)	University of Washington	Ph.D. (pending)

SOURCE: NRC, Surveys of Doctoral and Pending Doctoral Programs for Nurses, Washington, D.C., 1978.

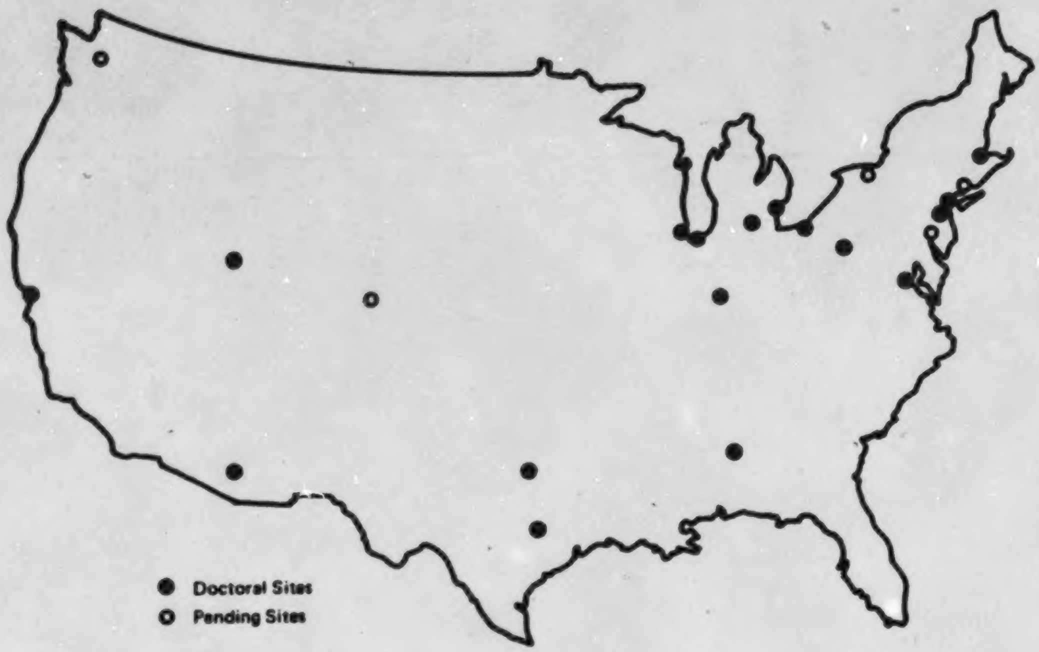

FIGURE 6.1 Schools of nursing with doctoral or pending doctoral programs, 1977-78. Drawing based on unpublished data from American Association of Colleges of Nursing, Washington, D.C., 1978, and NRC, Surveys of Doctoral and Pending Doctoral Programs for Nurses, Washington, D.C., 1978.

The surveys and site visits were conducted between December 1977 and April 1978. The following highlights are derived from the summary tables found in Appendix I:

- Both master and doctoral program enrollments in schools of nursing have increased since 1974, with projections showing continued growth through 1982-83 (Appendixes I 1.1-I 2).

Some institutions, especially those in the West and in the Northeast, reported plans to stablize master's degree enrollments in order to permit development of doctoral programs (Appendix I 1.2), while the remaining institutions anticipated growth at both levels of training through 1982-83. No institution reported a curtailment in master's degree enrollments to permit the exclusive development of doctoral training.

- In 1977-78 more doctoral students in nursing research received stipend support than in 1974-75 in every category of support (Appendix I 3).

It appears that institutional commitment to doctoral program development at a school of nursing is reflected in part in the increased support provided from state and institutional sources for doctoral students. Similarly, the expanded federal commitment to doctoral education for nurses has permitted an increasing number of stipends in some institutions.

While doctoral enrollments and available student support have expanded in recent years at almost every institution surveyed, a comparison of the research environments reveals a high degree of variability among the institutions at this time. Over half the institutions with doctoral or pending doctoral programs reported fewer than 20 faculty members engaged in at least one research project in October 1977 (Appendix I 4.1). Research projects which were funded typically were funded at a level well below $100,000 per fiscal year (Appendix I 6.1).

A number of institutions, it must be added, are strengthening research activities through research development support (Appendix I 7.1-I 7.2). However, most deans believe their single greatest need at this time to be research faculty (Appendix I 8.1). This response was unanimous for institutions located in the Northeast (Appendix I 8.2).

Table 6.3 summarizes the survey findings with respect to the variability of the research climate among the schools of nursing with doctoral programs included in this survey:

- Over half the institutions had more doctoral students than the number of faculty engaged in at least one research project. This ranged from a ratio of 200 doctoral students to four research faculty at one institution, to five doctoral students to 35 research faculty at another (Table 6.3).
- On average only seven faculty members were engaged in more than one research project at each institution providing doctoral training, although this number varied from zero at two institutions to 18 at another (Table 6.3).
- Of the 10 schools of nursing with doctoral programs included in this survey, seven had been awarded federal research grants or contracts, ranging from one grant at one site to 12 at another (Table 6.3).
- Half the institutions with doctoral programs held federally funded research development grants or contracts in October 1977 (Table 6.3).

While the variability in these research components can be attributed in part to the age of the doctoral program and differences in training emphasis, it is clear that certain programs possess a greater number of attributes that make up a sound doctoral training experience than others.

Because a strong research climate is essential to the production of doctorates in every area of scientific inquiry, the Com-

TABLE 6.3 Total Number of Doctoral Students and Research Faculty and Number of Federally Financed Research Grants and Contracts in Selected Schools of Nursing with Doctoral Programs (October 1977)

Institution	1977-78 Doctoral Program Enrollments	Total Faculty in School of Nursing[a]	Number of Faculty in Research		Total No. Federally Funded Res. Grants/Contracts	Total No. Federally Funded Research Development Grants/Contracts
			Engaged in at Least One Project	More Than One Project		
A	200	39	4	2	0	1
B	31	99	25	0	0	0
C	5	74	35	11	4	0
D	49	56	15	5	0	1
E	32	107	60	10	5	0
F	7	69	10	5	1	0
G	28	140	52	18	5	1
H	14	67	10	4	1	0
I	16	86	12	0	4	1
J	17	126	22	10	12	1

[a] Variations in record keeping disallowed an estimate of the total number of faculty assigned to the doctoral program in some institutions; therefore, the total number of faculty, including undergraduate faculty, has been used here.

SOURCE: NRC, Survey of Doctoral Programs for Nurses, Washington, D.C., 1978.

mittee and its Ad Hoc Advisory Group on Nursing Research believe that a unified effort to strengthen existing and proposed doctoral training programs in schools of nursing with respect to research involvement by the faculty is critical at this time. In fact, the Commmittee would urge the professional community of nursing to give serious consideration to slowing voluntarily the proliferation of new programs for doctoral training in nursing until existing programs acquire greater strength in those aspects which contribute to quality doctoral education: a high proportion of faculty actively engaged in research; adequate research facilities; research grant and contract support; and provision of opportunities for students to gain research experience in addition to basic clinical and administrative skills.

A number of factors seem to be contributing to the variation in research climate noted among those institutions surveyed. Some of these factors can be addressed locally, while others require direct federal involvement.

- As doctoral programs have developed, faculty often have been required to shift their emphasis from teaching/administration to research. In many instances, doctorally trained faculty who had not been actively involved in research have been given little opportunity to update their research skills.

Some institutions have added "research coordinators" to graduate program staff. These individuals primarily serve as advisors to faculty interested in developing research proposals or coordinate research efforts with other staff or departments. These research coordinators also convene seminars and workshops to review research ideas, provide refresher courses, or plan research strategies.

- In some institutions, federal policies relative to the renewal of research development funding have disallowed certain institutions from continuing to receive needed support.

Deans, for example, have indicated that faculty turnover in recent years and the addition of new faculty with active research interests lead to changing research development needs. Some doctoral training institutions that have received up to 10 years of development support through such programs as the Faculty Research Development Grants program of the Division of Nursing (Gortner, 1973; NRC, 1975-77: 1977 report) find that they are now ineligible for further research development support despite the fact that this continues to be a need at their institutions.

In view of the urgent need to upgrade the research climate in schools of nursing that now are engaged in doctoral training or shortly will be, it is clear that a review of federal regulations for research development support in schools of nursing is needed. Such a review hopefully would lead to a resolution of the current dilemmas discussed here.

RECOMMENDATIONS

It has been only 2 years since the NRSA authority was extended to include the predoctoral and postdoctoral research training programs offered through the Division of Nursing (NRC, 1975-77: 1977 report). Since that time the Division has completed 1 year of NRSA program support (FY 1977) and has continued to develop this program generally along the lines suggested by the Committee in its recommendations announced last year (Gortner and Bourgeois, 1978). The Committee and its Ad Hoc Advisory Group on Nursing Research have had the opportunity to consult with representatives from the Division of Nursing about these Commmittee recommendations. These discussions have been beneficial in monitoring NRSA program development by the Division and in guiding the Committee's deliberations this year.

The Committee has seen no evidence from the Division of Nursing, from NRC survey activities or from the professional community suggesting that either the scope or direction of NRSA program development recommended by the Committee is inappropriate. The Committee has devoted its attention this year, therefore, largely to a refinement of its previous recommendations.

The Committee recognizes, of course, that the recommendations it is making may require modification as the Division of Nursing undertakes its initial implementation in FY 1979.

The Committee sees no need to review these recommendations annually, since a period of time must elapse before their full impact on the development of doctoral education in nursing will be evident. The Committee reserves the right, of course, to comment in the future on the general direction of NRSA program development by the Division of Nursing but generally views this year's recommendations as guidelines for NRSA program development beyond FY 1982.

Predoctoral/Postdoctoral Training

In its 1977 report, the Committee suggested that up to 15 percent of the total number of awards made by the Division of Nursing be made at the postdoctoral level "as properly qualified candidates present themselves" (NRC, 1975-77: 1977 report).

As figures for FY 1977 (Table 6.4) reveal, the ratio of predoctoral to postdoctoral awards by the Division are well within the guidelines suggested by the Committee for FY 1979.

TABLE 6.4 Committee Recommendations for HRA Division of Nursing Predoctoral and Postdoctoral Awards in Nursing Research

Agency Awards and Committee Recommendations	Fiscal Year					
	1977	1978(est)	1979	1980	1981	1982
Actual awards						
Total	*98*	*175*[a]				
Pre	*91*	*150*				
Post	*7*	*25*				
1977 recommendations						
Total			225	240[b]	270[b]	
Pre			193	205	230	
Post			32	35	40	
1978 recommendations						
Total				240	270	300
Pre				205	230	255
Post				35	40	45

[a] Based on a budget estimate of $1.5 million.

[b] Figures corrected from 1977 Committee report to reflect a total of 15 percent postdoctoral awards.

Supplementary data received by the Committee[3] reveal, however, that this proportion is not evident when traineeships and fellowships are assessed independently. Instead, the Committee notes that six of the seven institutional trainees supported in FY 1977 were postdoctoral appointees.

The Committee would like to clarify its recommendation regarding postdoctoral research training support in nursing research. There is a real need to expand the pool of doctorally trained research personnel in nursing to provide research faculty for the rapidly proliferating doctoral programs in nursing. Primary emphasis, therefore, should be placed on predoctoral research training at this time. To meet these needs, the Committee emphasizes, therefore, that no more than 15 percent of the institutional traineeships and 15 percent of the individual fellowships are to be made available for postdoctoral research training as qualified candidates present themselves. This leaves the majority of awards at the predoctoral level for both mechanisms of support.

Recommendation. The Committee recommends that up to 15 percent of the total number of research training awards made available by the Division of Nursing be made at the postdoctoral level as qualified candidates present themselves.

Traineeships

In its 1977 report, the Committee recommended that training grants be given primarily to schools of nursing to establish interdisciplinary programs for nurses in cooperation with university departments in the biological, physical, or behavioral sciences. Acknowledging that nursing research has become a distinct area of scientific inquiry, the Committee recommended that a limited number of institutional grants be provided for research training in graduate departments of well-qualified schools of nursing.

Until a greater number of schools of nursing with doctoral programs can demonstrate a capacity to provide a strong research environment for doctoral candidates, the Committee reaffirms its recommendation that the majority of institutional awards should be given to nursing schools for training doctoral candidates in basic science departments that have established relationships with schools of nursing in the pattern of the former Nurse Scientist Training Program. The Committee recognizes, of course, that restrictions such as the limit on the proportion of funds available for institutional costs under the NRSA authority will require a new approach to this former program of institutional training arrangements.

The Committee recommends not restricting NRSA institutional awards to graduate departments in schools of nursing. At a time when substantial differences in the quality of the research environment exist in the various schools of nursing engaged in doctoral education, the approach described above would assure the production of well-qualified investigators.

Recommendation. The Committee recommends that the program of institutional training grant support in nursing research continue to be expanded at the rate specified in Table 1.2. The Committee recommends that institutional awards be made primarily for training nurses in basic science departments that have established relationships with schools of nursing, in the pattern of the former Nurse Scientist Training Program, and that only a limited number of training grants be provided for research training in graduate departments in well-qualified schools of nursing.

Fellowships

In its 1977 report, the Committee called for a major reorientation of fellowship support so that a substantial reduction would occur in the number of individuals receiving fellowships in non-science departments (NRC, 1975-77: 1977 report).

Data from the Division of Nursing reveal that a significant step in this direction has been taken in the past year. Of the total number of fellowship applications approved during FY 1977 through January 1978, only 25 percent represented fields other than the basic biomedical, behavioral, and clinical sciences (Gortner and Bourgeois, 1978).

In view of the fact that this change in program emphasis is continuing, the Committee recommends that the total number of fellowship awards remain at 175 through FY 1982 when further assessment of the development of this program will be made (Table 1.2).

Recommendation. The Committee recommends that the annual number of fellowship awards by the Division of Nursing remain at 175 through FY 1982, while the shift to training in nursing research is completed.

Midcareer Research Training

The Committee and its Ad Hoc Advisory Group on Nursing Research Personnel note that there are a number of doctorally trained nurses who may need to have their research skills upgraded because of advances in nursing research. There also are nurses whose employment experiences have prepared them to pursue doctoral training as a midcareer development.

This pool of potential investigators represents a promising, yet largely untapped, resource for nursing research.

It is clear that the current NRSA stipend level is inadequate to attract such personnel into research careers. It is less clear whether the payback provisions are sufficiently flexible to encourage these individuals to seek NRSA support.

Because opportunities for midcareer research training would enrich the rapidly expanding nursing research labor force, in the coming year the Committee will assess the means by which training support should be made available to recruit research personnel at this stage of their professional career development.

FOOTNOTES

1. The Health Research and Health Services Amendments of 1976 (P.L. 94-278) extended the NRSA authority to include the programs of research training offered by the HRA Division of Nursing. The 1977 Committee report was the first attempt to address training needs in nursing research.

2. In addition to payback requirements, such provisions as the period of support and the amount of institutional allowance are unique to the NRSA program and would require a reformulation of the former Nurse Scientist Training Program.

3. Correspondence from Dr. Susan Gortner, HRA Division of Nursing, to Pamela Ebert-Flattau, Committee staff, March 20, 1978.

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APPENDIX A

NATIONAL RESEARCH SERVICE AWARD AUTHORITY

NATIONAL RESEARCH SERVICE AWARD AUTHORITY

Public Law 93-348, as amended

NATIONAL RESEARCH SERVICE AWARDS

SEC. 472. (a)(1) The Secretary shall— 42 U.S.C. 289l-1

(A) provide National Research Service Awards for—

(i) biomedical and behavioral research at the National Institutes of Health and the Alcohol, Drug Abuse, and Mental Health Administration or under programs administered by the Division of Nursing of the Health Resources Administration, in matters relating to the cause, diagnosis, prevention, and treatment of the diseases or other health problems or Division of Nursing.

(ii) training at the Institutes and Administration of individuals to undertake such research,

(iii) biomedical and behavioral research at public institutions and at nonprofit private institutions, and

(iv) pre- and post doctoral training at such public and private institutions of individuals to undertake such research; and

(B) make grants to public institutions and to nonprofit private institutions to enable such institutions to make to individuals selected by them National Research Service Awards for research (and training to undertake such research) in the matters described in subparagraph (A)(i).

A reference in this subsection to the National Institutes of Health or the Alcohol, Drug Abuse, and Mental Health Administration shall be considered to include the institutes, divisions, and bureaus included in the Institutes or under the Administration, as the case may be.

(2) National Research Service Awards may not be used to support residencies.

(3) Effective July 1, 1975, National Research Service Awards may be made for research or research training in only those subject areas for which, as determined under section 473, there is a need for personnel.

(b)(1) No National Research Service Award may be made by the Secretary to any individual unless—

(A) the individual has submitted to the Secretary an application therefor and the Secretary has approved the application;

(B) the individual provides, in such form and manner as the Secretary shall by regulation prescribe, assurances satisfactory to the Secretary that the individual will meet the service requirement of subsection (c)(1); and

(C) in the case of a National Research Service Award for a purpose described in subsection (a)(1)(A)(iii) or (a)(1)(A)(iv), the individual has been sponsored (in such manner as the Secretary may by regulation require) by the institution at which the research or training under the Award will be conducted.

An application for an Award shall be in such form, submitted in such manner, and contain such information, as the Secretary may by regulation prescribe.

(2) The award of National Research Service Awards by the Secretary under subsection (a) and the making of grants for such Awards shall be subject to review and approval by the appropriate advisory councils within the Department of Health, Education, and Welfare (A) whose activities relate to the research or training under the Awards, or (B) at which such research or training will be conducted.

(3) No grant may be made under subsection (a)(1)(B) unless an application therefor has been submitted to and approved by the Secretary. Such application shall be in such form, submitted in such manner, and contain such information, as the Secretary may by regulation prescribe. Subject to the provisions of this section other than paragraph (1) of this subsection, National Research Service Awards made under a grant under subsection (a)(1)(B) shall be made in accordance with such regulations as the Secretary shall prescribe.

(4) The period of any National Research Service Award made to any individual under subsection (a) may not exceed three years in the aggregate unless the Secretary for good cause shown waives the application of the three-year limit to such individual.

(5) National Research Service Awards shall provide for such stipends and allowances (including travel and subsistence expenses and dependency allowances) for the recipients of the Awards as the Secretary may deem necessary. A National Research Service Award made to an individual for research or research training at a non-Federal public or nonprofit private institution shall also provide for payments to be made to the institution for the cost of support services (including the cost of faculty salaries, supplies, equipment, general research support, and related items) provided such individual by such institution. The amount of any such payments to any institution shall be determined by the Secretary and shall bear a direct relationship to the reasonable costs of the institution for establishing and maintaining the quality of its biomedical and behavioral research and training programs.

(c)(1)(A) Each individual who receives a National Research Service Award shall, in accordance with paragraph (3), engage in—

(i) health research or teaching or any combination thereof which is in accordance with usual patterns of academic employment,

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(ii) if authorized under subparagraph (B), serve as a member of the National Health Service Corps or serve in his specialty, or

(iii) if authorized under subparagraph (C), serve in a health related activity approved under that subparagraph,

for a period computed in accordance with paragraph (2).

(B) Any individual who received a National Research Service Award and who is a physician, dentist, nurse, or other individual trained to provide health care directly to individual patients may, upon application to the Secretary, be authorized by the Secretary to—

(i) serve as a member of the National Health Service Corps,

(ii) serve in his specialty in private practice in a geographic area designated by the Secretary as requiring that specialty, or

(iii) provides services in his specialty for a health maintenance organization to which payments may be made under section 1876 of title XVIII of the Social Security Act and which serves a medically underserved population (as defined in section 1302 (7) of this Act),

in lieu of engaging in health research or teaching if the Secretary determines that there are no suitable health research or teaching positions available to such individual.

(C) Where appropriate the Secretary may, upon application, authorize a recipient of a National Research Service Award, who is not trained to provide health care directly to individual patients, to engage in a health-related activity in lieu of engaging in health research or teaching if the Secretary determines that there are no suitable health research or teaching positions available to such individual.

(2) For each year for which an individual receives a National Research Service Award he shall—

(A) for twelve months engage in health research or teaching or any combination thereof which is in accordance with the usual patterns of academic employment, or, if so authorized, serve as a member of the National Health Service Corps, or

(B) if authorized under paragraph (1)(B) or (1)(C), for twenty months serve in his specialty or engage in a health-related activity.

(3) The requirement of paragraph (1) shall be complied with by any individual to whom it applies within such reasonable period of time, after the completion of such individual's Award, as the Secretary shall by regulation prescribe. The Secretary shall (A) by regulation prescribe (i) the type of research and teaching which an

individual may engage in to comply with such requirement, and (ii) such other requirements respecting such research and teaching and alternative service authorized under paragraphs (1)(B) and (1)(C) as he deems necessary; and (B) to the extent feasible, provide that the members of the National Health Service Corps who are serving in the Corps to meet the requirement of paragraph (1) shall be assigned to patient care and to positions which utilize the clinical training and experience of the members.

(4)(A) If any individual to whom the requirement of paragraph (1) is applicable fails, within the period prescribed by paragraph (3), to comply with such requirement, the United States shall be entitled to recover from such individual an amount determined in accordance with the formula—

$$A=\phi\left(\frac{t-\frac{1}{2}s}{t}\right)$$

in which "A" is the amount the United States is entitled to recover; "ϕ" is the sum of the total amount paid under one or more National Research Service Awards to such individual; "t" is the total number of months in such individual's service obligation; and "s" is the number of months of such obligation served by him in accordance with paragraphs (1) and (2) of this subsection.

(B) Any amount which the United States is entitled to recover under subparagraph (A) shall, within the three-year period beginning on the date the United States becomes entitled to recover such amount, be paid to the United States. Until any amount due the United States under subparagraph (A) on account of any National Research Service Award is paid, there shall accrue to the United States interest on such amount at a rate fixed by the Secretary of the Treasury after taking into consideration private consumer rates of interest prevailing on the date the United States becomes entitled to such amount.

(5)(A) Any obligation of any individual under paragraph (3) shall be canceled upon the death of such individual.

(B) The Secretary shall by regulation provide for the waiver or suspension of any such obligation applicable to any individual whenever compliance by such individual is impossible or would involve extreme hardship to such individual and if enforcement of such obligation with respect to any individual would be against equity and good conscience.

(d) There are authorized to be appropriated to make payments under National Research Service Awards and under grants for such Awards $207,947,000 for the fiscal year ending June 30, 1975, $165,000,000 for fiscal year 1976, and $185,000,000 for fiscal year 1977. Of the sums appropriated under this subsection, not less than 25 per centum shall be made available for payments under National Research Service Awards provided by the Secretary under subsection (a)(1)(A).

STUDIES RESPECTING BIOMEDICAL AND BEHAVIORAL RESEARCH PERSONNEL

SEC. 473. (a) The Secretary shall, in accordance with subsection (b), arrange for the conduct of a continuing study to— 42 U.S.C. 289l-2

(1) establish (A) the Nation's overall need for biomedical and behavioral research personnel, (B) the subject areas in which such personnel are needed and the number of such personnel needed in each such area, and (C) the kinds and extent of training which should be provided such personnel;

(2) assess (A) current training programs available for the training of biomedical and behavioral research personnel which are conducted under this Act at or through institutes under the National Institutes of Health and the Alcohol, Drug Abuse, and Mental Health Administration, and (B) other current training programs available for the training of such personnel;

(3) identify the kinds of research positions available to and held by individuals completing such programs;

(4) determine, to the extent feasible, whether the programs referred to in clause (B) of paragraph (2) would be adequate to meet the needs established under paragraph (1) if the programs referred to in clause (A) of paragraph (2) were terminated; and

(5) determine what modifications in the programs referred to in paragraph (2) are required to meet the needs established under paragraph (1).

(b)(1) The Secretary shall request the National Academy of Sciences to conduct the study required by subsection (a) under an arrangement under which the actual expenses incurred by such Academy in conducting such study will be paid by the Secretary. If the National Academy of Sciences is willing to do so, the Secretary shall enter into such an arrangement with such Academy for the conduct of such study.

(2) If the National Academy of Sciences is unwilling to conduct such study under such an arrangement, then the Secretary shall enter into a similar arrangement with other appropriate nonprofit private groups or associations under which such groups or associations will conduct such study and prepare and submit the reports thereon as provided in subsection (c).

(3) The National Academy of Sciences or other group or association conducting the study required by subsection (a) shall conduct such study in consultation with the Director of the National Institute of Health.

(c) A report on the results of such study shall be submitted by the Secretary to the Committee on Interstate and Foreign Commerce of the House of Representatives and the Committee on Labor and Public Welfare of the Senate not later than September 30 of each year.

APPENDIX B

NIH/ADAMHA/HRA ANNOUNCEMENTS FOR FY 1979 NATIONAL RESEARCH SERVICE AWARD PROGRAMS

NIH Guide for Grants and Contracts
Vol. 6, No. 20, November 14, 1977

NATIONAL RESEARCH SERVICE AWARDS FOR INSTITUTIONAL GRANTS

ANNOUNCEMENT

Beginning with the February 1, 1978 receipt date NIH will accept institutional applications for National Research Service Awards on the same schedule as individual applications. Institutional applications for awards to begin July 1, 1979 should be received by June 1, 1978. Applications must be identified as responding to one or more of the areas listed in this Announcement.

Awards are subject to legislative authority and availability of funds.

Under authority of Section 472 of the Public Health Service Act as amended (42 USC 2891-1), the National Institutes of Health (NIH) awards grants to eligible institutions to develop or enhance research training opportunities for individuals selected by them who are interested in careers in specified areas of biomedical and behavioral research. Title 42 of the Code of Federal Regulations, Part 66, is applicable to these awards.

Domestic nonprofit private or non-Federal public institutions may apply for grants to support training programs in specified areas of research. Predoctoral and postdoctoral trainees may be supported if either or both level(s) of training are justified in the application and approved. The applicant institution must have, or be able to develop, the staff and facilities required for the proposed programs. The training program director at the institution will be responsible for the selection and appointment of trainees to receive National Research Service Awards and for the overall direction of the program.

The proposed program must encompass supervised biomedical research in one or more of the specified areas, and offer opportunity for research training leading to the research degree, or, for those who have already attained the research degree, opportunity to broaden their scientific background; for those who have attained the health professional degree the supervised research should be accompanied by training in scientific methodology. National Research Service Awards (NRSA) will not support study leading to the M.D., D.O., D.D.S., or other similar professional degrees, nor will they support non-research clinical training.

Application material. Application material may be obtained from the Grants Inquiries Office, Division of Research Grants, National Institutes of Health, Bethesda, Maryland 20014. A self-addressed gummed mailing label enclosed in the request for kits will expedite handling.

Applicants are advised to contact the person designated in the area listing to discuss any questions, and especially if

(1) an application including predoctoral training is planned, or

(2) compatibility between institutional and agency training aims is in doubt, or

(3) questions arise as to waiver provision for the three-year limit on NRSA support. (Note that the aim of obtaining postdoctoral training after NRSA-supported predoctoral training is cited in the regulations as "good cause" for granting a waiver to the three-year limit (§66.106(d)).)

Review and selection. NRSA grant applications will be evaluated by initial review groups at the NIH; they are also subject to review and approval by the appropriate advisory council of the NIH. The application will be evaluated on the basis of records and qualifications of participating faculty, the proposed research training objectives and program design, previous training record of the program and its ability to attract high caliber students, institutional commitment, facilities and environment, and relationship of the proposed program goals to need for research personnel.

GENERAL PROVISIONS

Eligibility requirements. Individuals appointed as trainees on the grant must be citizens or non-citizen nationals of the United States, or must have been lawfully admitted to the United States for permanent residence and have in their possession an Alien Registration Receipt Card (I-151) at time of appointment. A non-citizen national is a person who, although not a citizen of the United States, owes permanent allegiance to the United States. They are generally persons born in lands which are not States, but which are under United States sovereignty, jurisdiction, or administration (e.g. American Samoa). Individuals on temporary or student visas are not eligible.

Predoctoral trainees must have received an appropriate baccalaureate degree as of the date of appointment to the approved training program. An individual at the postdoctoral level must have received as of the date of appointment to the approved training program, a Ph.D., M.D., D.D.S., D.O., D.V.M., O.D., Sc.D., D.Eng., D.N.S., or equivalent domestic or foreign degree.

Stipends and other training costs. Stipends and allowances requested will be as follows: At the predoctoral, level the annual stipend is $3,900.

For postdoctorals, the stipend for the first year of support is determined by the number of years of prior relevant postdoctoral experience at time of appointment in accordance with the accompanying table. Relevant experience may include research experience (including industrial), teaching, internship, residency, or other time spent in full-time pursuit of additional degrees or full-time studies in a health-related field at a level beyond that of the qualifying doctoral degree. The stipend for each additional year of support is based on the level of the first year plus $400 for each additional year under the National Research Service Award. There is no allowance for dependents.

Postdoctoral Stipends

Years of Relevant Experience at Time of Initial Appointment	Year of Award		
	1st Year	2nd Year	3rd Year
0	$10,000	$10,400	$10,800
1	10,800	11,200	11,600
2	11,500	11,900	12,300
3	12,200	12,600	13,000
4	12,800	13,200	13,600
5 or more	13,200	13,600	14,000

Tuition and travel may be requested. Tuition at the postdoctoral level is limited to that required for specified courses. The institution may request tuition and fees (including appropriate medical insurance) only to the extent that the same resident or nonresident tuition and fees are charged to regular non-federally supported students; the institution may request actual indirect costs or 8% of allowable direct costs (whichever is less) and up to 25% of the total award for costs deemed essential to carry out the NRSA training program such as salaries, equipment, research supplies, staff travel, etc.

Period of support. Awards for institutional grants may be made for project periods of up to 5 years. However, no individual may receive more than three years of support in the aggregate from a National Research Service Award. Any exception to this requires a waiver from the Agency head based on review of justification from the trainee and the grantee institution.

Conditions of award. No trainee may be supported unless a Statement of Appointment form and a signed Payback Agreement indicating his or her intent to meet the service or payback provisions required under the law have been submitted to NIH. Trainee appointments are made for full-time research training and research. Trainees may utilize some of their time in academic studies and clinical duties if such work is closely related to their research training experience.

A NRSA award may not be held concurrently with another Federally sponsored fellowship or similar Federal award which provides a stipend or otherwise duplicates provisions of the NRS award. NRSA recipients may, however, accept concurrent educational remuneration from the Veterans Administration (e.g. G.I. Bill) and loans from Federal funds.

Supplementation of the NRSA stipend from non-Federal funds is permitted. Other Federal funds may be used for supplementation only if explicitly authorized by the program from which such funds are derived. No NIH, ADAMHA, or DN grant funds may be used for supplementation. This is not intended to discourage in any way the use of Federal loan funds. This additional support may be provided without obligation by the trainee or may be conditioned on his or her performance of certain services such as teaching or serving as a laboratory assistant. Under no circumstances, however, should the service requirements detract from or prolong the training.

Within two years after completion of NRSA support, recipients of NRS Awards are to engage in continuous health-related biomedical or behavioral research or teaching or any combination thereof which is in accordance with usual patterns of academic employment for a period equal to the period of support. Alternatively, if the Secretary, DHEW, determines there are no suitable health research or teaching positions available to the individual, the following may be authorized: (1) If the individual is a physician, dentist, nurse, or other individual trained to provide health care directly to patients, the Secretary may authorize (a) service in the National Health Service Corps, (b) service in his or her specialty in a geographic area designated by the Secretary, or (c) service in his or her specialty in a health maintenance organization serving a medically underserved population; (2) If the individual who received the NRS Award is not trained to provide health care to patients, the Secretary may authorize the individual to engage in some other health-related activity. For each year for which an individual receives a NRS Award he or she shall (a) engage in twelve months of health research or teaching, (b) serve 12 months as a member of the National Health Service Corps, or (c) if authorized by the Secretary for one of the other alternatives, shall serve twenty months for each year of award.

For individuals who fail to fulfill their obligation through service, the United States is entitled to recover an amount equal to the total stipend received plus interest. The amount is computed in accordance with a formula which gives only one-half credit for each month of service when the total payback obligation is not completely fulfilled through service. Interest on the amount begins on the date the United States becomes entitled to such amount; it is computed at a rate fixed by the Secretary of the Treasury considering private consumer rates prevailing on that date. Payment must be completed within three years.

By Federal Regulation, there are certain conditions under which the Secretary, HEW, may extend the period for undertaking service or for repayment, permit breaks in service, or otherwise waive or suspend the payback obligation of an individual where enforcement of the obligation would involve extreme hardship or be against equity and good conscience.

Trainees are not entitled to vacations, as such, although those at academic institutions may take the holidays at Christmas, in the Spring, etc., and the short period between semesters or quarters. The time between a summer session and a fall semester is considered an active part of the training period. Those at non-academic institutions are entitled to the normal holiday and vacation periods of the institution.

Taxability of stipends. The Internal Revenue Service has ruled that the NRSA awards are made primarily for the benefit of the grantor and are accordingly not excludable from gross income as fellowships. (IRS Bulletin No. 1977-36, dated September 6, 1977.)

Notification of final action. The applicant will be notified by the awarding unit of the final action on the application by either an award notice or by a letter.

For additional information on the above program write: Office of Research Manpower, Division of Research Grants, National Institutes of Health, Bethesda, Maryland 20014.

The Alcohol, Drug Abuse, and Mental Health Administration and the Division of Nursing, Health Resources Administration, also provide support through National Research Service Awards. For information and application forms, contact the appropriate agency.

APPENDIX B1.2

June 1, 1978

NATIONAL RESEARCH SERVICE AWARDS
FOR
INDIVIDUAL POSTDOCTORAL FELLOWS

ANNOUNCEMENT

February 1, June 1 and October 1 are the annual receipt dates for individual National Research Service Award applications. Results of review will be announced the following November, March and June respectively, with a possible start date the following month.

Awards are subject to legislative authority and the availability of funds.

Under authority of Section 472 of the Public Health Service Act as amended (42 USC 2891-1), the National Institutes of Health (NIH) provides National Research Service Awards to postdoctoral individuals for training experiences in biomedical and behavioral research. (See Attachment for research areas.)

Awards are made to individual applicants, for specified training proposals, selected as a result of a national competition. Title 42 of the Code of Federal Regulations, Part 66, is aplicable to these awards.

Eligibility requirements. Applicants must be citizens or non-citizen nationals of the United States, or have been lawfully admitted to the United States for permanent residence and have in their possession an Alien Registration Receipt Card (I-151) at time of application. Non-citizen nationals are persons who, although not citizens of the United States, owe permanent allegiance to the United States. They are generally persons born in lands which are not States, but which are under United States sovereignty, jurisdiction, or administration (e.g. American Samoa). Individuals on temporary or student visas are not eligible.

As of the beginning date of the proposed fellowship, an applicant must have received a Ph.D., M.D., D.D.S., D.O., D.V.M., O.D., Sc.D., D.Eng., D.N.S., or equivalent domestic or foreign degree. Proposed study must encompass biomedical or behavioral research training with an opportunity to carry out supervised research and offer opportunity to research health scientists, research clinicians, etc., to broaden their scientific background, or to extend their potential for research in health-related areas. National Research Service Awards (NRSA) are not made for study leading to the M.D., D.O., D.D.S., or other similar professional degrees. Neither will these awards support non-research clinical training.

Prior to formal submission, an applicant must arrange for appointment to an appropriate institution and acceptance by a sponsor who will supervise his or her training and research experience. The institutional setting may be a domestic non-profit private or public institution including the NIH and ADAMHA. The application must document the availability of staff and facilities to provide a suitable environment for performing high-quality work. The major emphasis of the application should be the research training experience and broadening of scientific competence.

Under exceptional circumstances when such study and opportunity are not available at any domestic institution, an individual may request support for study abroad. Such applicant will be required to provide detailed justification based on the unique facilities and/or training opportunity that are of the nature and caliber that they cannot be found in the U.S. and the particular suitability of the foreign situation, rather than the domestic, to the proposed research.

Documents to be submitted. The applicant must submit (1) an application (PHS 416-1), (2) a signed assurance that the service or payback requirement will be complied with, if an award is made, and (3) if a non-citizen, a notarized statement of permanent residence. Since a complete application includes the sponsor's Facilities and Commitment Statement, that Statement (PHS 416-2) must be with the application when submitted. In addition, an applicant will arrange for the submission of reference reports (PHS 416-3) on his or her behalf.

An individual may not have two competing applications pending review concurrently in the National Research Service Award program.

Application material. Individuals are encouraged to review the eligibility criteria before requesting application kits from Grants Inquiries, Division of Research Grants, National Institutes of Health, Bethesda, Maryland 20014. If a self-addressed gummed mailing label is enclosed in the request for kits, it will expedite handling.

Application Receipt Date	Advisory Council Review	Results Announced by	Earliest Possible Start Date
October 1	May	June	July 1
February 1	Sept./Oct.	November	December 1
June 1	Jan./Feb.	March	April 1

Annual stipends and allowances. The stipend level for the first year is determined by the number of years of prior relevant postdoctoral experience at the time of award. Relevant experience may include research experience (including industrial), teaching, internship, residency, or other time spent in full-time pursuit of additional degrees or full-time studies in a health-related field at a level beyond that of the qualifying doctoral degree.

The stipend for each additional year of support is based on the level of the first year plus $400 for each additional year under the NRSA.

Postdoctoral Stipends

Years of Relevant Experience at Time of Initial Award	Year of Award		
	1st Year	2nd Year	3rd Year
0	$10,000	$10,400	$10,800
1	10,800	11,200	11,600
2	11,500	11,900	12,300
3	12,200	12,600	13,000
4	12,800	13,200	13,600
5 or more	13,200	13,600	14,000

The stipend is a pre-established level of support to provide for the fellow's living expenses during the period of training. The stipend is not a payment for services performed. Fellows supported under individual awards are not considered to be employees either of PHS or of their sponsoring institution. For fellows sponsored by domestic non-Federal institutions, the payment of the stipend will be made through the sponsoring institution. For fellows sponsored by Federal or foreign institutions the stipend payment will be made directly by U.S. Treasury check.

No allowance will be provided for dependents or travel to a domestic training site. Fellows affiliating with foreign sponsoring institutions will receive a single economy or coach round-trip travel fare to the training site.

Upon request, the NIH will provide funds of up to $3,000 per 12-month period to the non-Federal sponsoring institution to help defray such trainee expenses as tuition and fees (including appropriate medical insurance), research supplies, equipment, travel to scientific meetings, and related items. The allowance is under control of the sponsoring institution. An allowance of up to $1,000 is available for the fellow sponsored by a Federal laboratory for scientific meeting travel expenses and appropriate medical insurance.

Period of support. No individual may receive more than three years of National Research Service Award support in the aggregate. Any exception to this requires a waiver from the Agency head based on review of justification from the applicant and sponsor. Any waiver request should be submitted with the application. Although fellowships are awarded for 12-month periods, assurances may be given by the awarding unit for continued support beyond the first year provided progress is satisfactory and funds are available.

Selection of awardees. Applications will be evaluated by initial review groups at the NIH and are also subject to review and approval of the appropriate advisory council of the NIH whose activities relate to the research training under the award. The application will be evaluated on the basis of past academic and research records, the research training proposal, the sponsor and training environment, the applicant's research goals, publications, reference reports, and other relevant information. NIH program interests and the availability of funds are also considered in the final selection.

Notification of final action. An applicant is notified by the awarding unit of the final action on the application by an award notice or by a letter.

Activation date. An awardee has until the end of 12 months from the issue date on the award notice to activate a new award.

Conditions of award. No award will be made to an individual unless that individual has signed and submitted a Payback Agreement indicating his or her intent to meet the service or payback provisions required under the law as a condition under which a National Research Service Award is made and accepted.

Individual awards are made for full-time research and research training. Health professional postdoctorals may utilize some of their time in clinical duties only if such work is part of the research training.

A NRSA award may not be held concurrently with another Federally sponsored fellowship or similar Federal award which provides a stipend or otherwise duplicates provisions of the award. NRSA recipients may, however, accept concurrent educational remuneration from the Veterans Administration (e.g. G.I. Bill) and loans from Federal funds.

Supplementation of the NRSA stipend from non-Federal funds is permitted. Other Federal funds may be used for supplementation only if explicitly authorized by the program from which such funds are derived. No NIH, ADAMHA, or DN grant funds may be used for supplementation. This is not intended to discourage in any way the use of Federal loan funds. This additional support may be provided without obligation by the trainee or may be conditioned on his or her performance of certain services such as teaching or serving as a laboratory assistant. Under no circumstances, however, should the service requirements detract from or prolong the training.

Fellows are not entitled to vacations, as such, although those at academic institutions may take the holidays at Christmas, in the Spring, etc., and the short period between semesters or quarters. The time between a summer session and a fall semester is considered an active part of the training period. Those at non-academic institutions are entitled to the normal holiday and vacation periods of the institution.

Payback requirement. Within two years after completion of NRSA support, recipients of NRS Awards are to engage in continuous biomedical or behavioral research or teaching or any combination thereof which is in accordance with usual patterns of academic employment for a period equal to the period of support. Alternatively, if the Secretary, DHEW, determines there are no suitable health research or teaching positions available to the individual, the following may be authorized: (1) If the individual is a physician, dentist, nurse, or other individual trained to provide health care directly to patients, the Secretary may authorize (a) service in the National Health Service Corps, (b) service in his or her specialty in a geographic area designated by the Secretary, or (c) service in his or her specialty in a health maintenance organization serving a medically underserved population; (2) If the individual who received the NRS Award is not trained to provide health care to patients, the Secretary may authorize the individual to engage in some other health-related activity. For each year for which an individual receives a NRS Award he or she shall (a) engage in twelve months of health research or teaching, (b) serve 12 months as a member of the National Health Service Corps, or (c) if authorized by the Secretary for one of the other alternatives, shall serve twenty months for each year of award.

For individuals who fail to fulfill their obligation through service, the United States is entitled to recover an amount equal to the amount paid to the individual plus interest. The amount is computed in accordance with a formula which gives only one-half credit to each month of service when the total payback obligation is not completely fulfilled through service. Interest on the amount begins and is at the rate fixed by the Secretary of the Treasury considering private consumer rates which prevail on the date the United States becomes entitled to such amount. Payment must be completed within three years from that date.

By Federal Regulation, there are certain conditions under which the Secretary, HEW, may extend the period for undertaking service or for repayment, permit breaks in service, or to otherwise waive or suspend the payback obligation of an individual where enforcement of the obligation would involve extreme hardship or be against equity and good conscience.

Taxability of stipends. The Internal Revenue Service has ruled that the NRSA awards are made primarily for the benefit of the grantor and are accordingly not excludable from gross income as fellowships. (IRS Bulletin No. 1977-36, dated September 6, 1977.)

For additional information on the above program write: Office of Research Manpower, Division of Research Grants, National Institutes of Health, Bethesda, Maryland 20014.

The Alcohol, Drug Abuse, and Mental Health Administration and the Division of Nursing, Health Resources Administration, also provide support through National Research Service Awards. For information and application forms, contact the appropriate agency.

ATTACHMENT
PAGE ONE

National Institutes of Health
Research Area List for Individual Postdoctoral National Research Service Awards

The research areas, in which applications will be accepted for individual postdoctoral awards are listed below by awarding units. Applicants should contact the individuals designated below for additional information concerning the areas of research.

NATIONAL INSTITUTE ON AGING

1. The biology of aging, e.g. biophysical, biochemical, cellular, organ or organismic aging, the pathologic changes in aging experimental animals.
2. The special medical problems of aging and the aged, e.g. preventive medicine and aging, the aging nervous system, senile dementia, aging of the endocrine system, aging of connective tissue structures, pharmokinetics and pharmodynamics in the aged.
3. Psychological aspects of aging and the aged, e.g. cognitive, personality, and attitudinal changes with age.
4. Societal aspects of aging, e.g. population age-structure and its impact on economic, societal, and individual function, retirement, social aspects of aging in different cultures.

Dr. Walter Spieth (301) 496-9666

NATIONAL INSTITUTE OF ALLERGY AND INFECTIOUS DISEASES

1. Allergic and Immunologic Diseases and Basic Immune Mechanisms
    - Allergy
    - Immunochemistry
    - Immunology

NIAID (Continued)

    - Immunopathology
    - Immunogenetics
    - Clinical Immunology
    - Autoimmunity
    - Transplantation Biology
2. Infectious Diseases and Basic Microbiological Mechanisms
    - Bacteriology
    - Virology
    - Parasitology
    - Mycology
    - Pathogenesis of Infectious Diseases
3. Epidemiology of Allergic, Immunologic, and Infectious Diseases

Dr. Louis D. Bourgeois (301) 496-7679

NATIONAL INSTITUTE OF ARTHRITIS, METABOLISM, AND DIGESTIVE DISEASES

Proposals should demonstrate capability to provide opportunity for (1) the clinically-trained to acquire expertise in scientific research (e.g. biochemistry, biophysics, cell biology, epidemiology, genetics, physiology, or psychology), and (2) the scientifically-trained to obtain further training in biomedical research or clinical investigation relating to:

Arthritis, Bone, or Skin Diseases
Diabetes, Endocrine, or Metabolic Diseases

(Continued)

NIAMDD (Continued)

Digestive Diseases, Liver Diseases, or Nutrition
Kidney, Urologic, or Blood Diseases

Office of Associate Director
(301) 496-7277

NATIONAL CANCER INSTITUTE

The goal of the Cancer Research Manpower Development Program is to insure that an adequate number of highly competent basic and clinical cancer research specialists will be trained to meet needs in the following areas of research:

Cancer Etiology and Prevention
Cancer Detection and Diagnosis
Cancer Treatment and Restorative Care

Mrs. Helen W. Denson (301) 496-7895

NATIONAL INSTITUTE OF CHILD HEALTH AND HUMAN DEVELOPMENT

Awards provide opportunities for research training in the biological and/or behavioral science aspects of the areas listed below.

Center for Research for Mothers and Children:

1. Pregnancy and Infancy
2. Developmental Biology & Nutrition
3. Learning and Behavior
4. Mental Retardation

Center for Population Research:

1. Fertility - Infertility
2. Fertility Regulation
3. Nutrition and Reproduction
4. Social and Behavioral Aspects of Reproduction
5. Population Change

Dr. Gilbert L. Woodside
(301) 496-1848

NATIONAL INSTITUTE OF DENTAL RESEARCH

*1. Behavioral Studies
2. Cariology
3. Craniofacial Anomalies
4. Mineralization
5. Nutrition
6. Pain Control
7. Periodontal Diseases
8. Restorative Materials
9. Salivary Secretions
10. Soft Tissue Diseases

*Additional information sharply defining the type of training needed in this area is available on request.

Dr. Robert J. Schullein (301) 496-7748

NATIONAL INSTITUTE OF ENVIRONMENTAL HEALTH SCIENCES

1. Environmental Toxicology (including Teratogenesis, Carcinogenesis and Behavioral Toxicology)
2. Environmental Mutagenesis
3. Environmental Pathology - Pathophysiology
4. Environmental Epidemiology and Biostatistics

Dr. Christopher Schonwalder
(919) 755-4022

NATIONAL EYE INSTITUTE

Laboratory and clinical research training related to vision and disorders of the visual system:

1. Retinal and Choroidal Diseases
2. Corneal Diseases
3. Cataract
4. Glaucoma
5. Sensory and Motor Disorders and Rehabilitation

(Continued)

NEI (Continued)

Preference will be given to two-year research training programs in the following areas as they relate to the above:

1. Immunology
2. Genetics
3. Pharmacology
4. Epidemiology
5. Physiology
6. Biochemistry
7. Developmental Biology
8. Psychophysics and Physiological Optics
9. Pathology

Chief, Scientific Programs Branch
(301) 496-5303

NATIONAL INSTITUTE OF GENERAL MEDICAL SCIENCES

1. Anesthesiology
2. Basic Pathobiology
3. Behavioral Sciences related to Medicine
4. Cellular and Molecular Biology
5. Clinical Laboratory Sciences
6. Clinical Pharmacology
7. Epidemiology
8. Genetics
9. Pharmacological Sciences
10. Systems and Integrative Biology
11. Trauma and Burn Research

(Support is also provided through the Minority Access to Research Careers program.)

Dr. Roger Fuson (301) 496-7368

NATIONAL HEART, LUNG, AND BLOOD INSTITUTE

1. *Division of Heart and Vascular Diseases*

NHLBI (Continued)

The research training may be in fundamental studies of basic processes and functions, behavioral studies, including risk factor modification (e.g. diet, smoking), genetics (including studies of populations) and primary or secondary prevention or clinical investigations directed toward long-term involvement in research toward increasing our knowledge and understanding in cardiovascular areas related to our programs in:

Hypertension
Arteriosclerosis
Coronary Heart Disease
Cardiovascular Aspects of Diabetes
Arrhythmias
Heart Failure and Shock
Cerebrovascular Disease
Peripheral Vascular Disease
Congenital and Rheumatic Heart Diseases
Cardiomyopathies and Infections of the Heart
Circulatory Assistance
Cardiovascular Devices and Technology

Dr. D. M. MacCanon (301) 496-1724

2. *Division of Lung Diseases*

The Division supports research training in fundamental and clinical disciplines.

Training programs should be addressed to one or more of the following categories:

Structure and Function of the Lung
Pediatric Pulmonary Diseases
Emphysema and Chronic Bronchitis
Fibrotic and Immunologic Lung Diseases
Respiratory Failure
Pulmonary Vascular Diseases
Epidemiology of Respiratory Diseases

Ms. Barbara Marzetta (301) 496-7668

(Continued)

NHLBI (Continued)

3. *Division of Blood Diseases and Resources*

The Division seeks to support research training awards in the areas of:

- Thrombosis
- Hemostasis
- Red Blood Cell Diseases
- Sickle Cell Disease
- Blood Resources
- Blood Banking Sciences

Dr. Fann Harding (301) 496-1817

NATIONAL INSTITUTE OF NEUROLOGICAL AND COMMUNICATIVE DISORDERS AND STROKE

Applications are accepted in the following four areas. Listed are examples of training disciplines in which applications would be appropriate.

1. Basic Neurosciences
   - Developmental Neurology
   - Neuroanatomy
   - Neurobiology
   - Nuerochemistry
   - Neuroimmunology
   - Neuropharmacology
   - Neurophysiology
   - Neuroradiobiology
   - Neurovirology
   - Sensory Physiology and Biophysics
2. Clinical Neurosciences
   - Clinical Investigation
   - Neuroepidemiology
   - Neuropathology
3. Basic Communicative Sciences
   - Audiology
   - Sensory Physiology and Biophysics
   - Speech Pathology

NINCDS (Continued)

4. Communicative Sciences
   - Audiology
   - Clinical Investigation
   - Otopathology
   - Speech Pathology

Dr. Raymond Summers (301) 496-9236

DIVISION OF RESEARCH RESOURCES

Laboratory Animal Science and Medicine

Dr. John Holman (301) 496-5175

APPENDIX B2

NIH Guide for Grants and Contracts
Vol. 6, No. 3, February 4, 1977 Page One

NATIONAL INSTITUTE OF
GENERAL MEDICAL SCIENCES

ANNOUNCEMENT

INSTITUTIONAL NATIONAL RESEARCH SERVICE AWARDS

The National Institute of General Medical Sciences is currently accepting applications from eligible institutions for support of highly selected, promising individuals who seek biomedical research training in the areas specified below.

It is the Institute's goal in the predoctoral programs to provide trainees broader access to thesis research opportunities across discipline and department lines while not sacrificing the standards of depth and creativity characteristic of the best Ph.D. programs. Cooperative involvement of faculty members from several departments as thesis research mentors is considered evidence for such breadth.

Programs for postdoctoral trainees should offer a wide range of research training opportunities. For individuals holding the Ph.D. degree, training should focus on advanced and specialized areas of research and offer appropriate opportunities to study clinical problems. For trainees holding a professional degree, at least two years of rigorous research training should be provided which is usually best accomplished in basic science departments.

The applicant is expected to present a detailed plan for the proposed training as well as criteria for trainee selection and mechanisms for quality control. The application should also give information on the qualifications of the proposed faculty participants, including their experience as trainors and their current research programs and support.

Separate applications for support of predoctoral and postdoctoral research training are required. In general, only one award in each of the ten areas listed below will be made to an institution. Further information regarding dates of application and notification, tenure, stipends, trainee eligibility, and required payback provisions may be found in the *NIH Guide for Grants and Contracts*, Vol. 6, No. 2, January 12, 1977.

For general information about these institutional NRS Award Programs, contact Dr. Margaret Carlson, Training Officer, National Institute of General Medical Sciences, Bethesda, Maryland 20014, telephone (301) 496-7585. Before preparing an application, applicants are strongly urged to contact the indicated staff member for the specific area.

NIGMS AREAS OF SUPPORT

Predoctoral Institutional National Research Service Awards

1. Cellular and Molecular Biology

Programs should be of a cross-disciplinary nature and involve in-depth study of biological problems at the level of the cellular and molecular sciences. The research training offered should bring together components of at least two departments or Ph.D.-degree programs (such as anatomical sciences, biochemistry, biophysics, chemistry, developmental biology, genetics, immunology, microbiology, neurobiology, and pathology). Dr. Charles A. Miller - (301) 496-7021

2. Genetics

Programs should emphasize the principles and mechanisms of genetics, with collaboration of faculty members representing a number of disciplines and research areas which may include chemistry, biochemistry, cell regulatory processes, population and behavioral aspects of heredity, and developmental biology. Dr. Dorothea S. Miller - (301) 496-7137

3. Pharmacological Sciences

Training should emphasize the acquisition of competence in the broad fields of pharmacology and toxicology to conduct research on drug actions and effects in living cells, in animals, and in man—ranging from the chemical to the clinical level, with thesis research opportunities in such disciplines/departments as biochemistry, chemistry, genetics, medicinal chemistry, physiology, and the neuro- and behavioral sciences as well as in pharmacology. Dr. Sara A. Gardner - (301) 496-7181

4. Systems and Integrative Biology

Research training should bring together components of varied resources and approaches of such disciplines/departments as physiology, bioengineering, biomathematics, nutrition, anatomical sciences, and the neuro- and behavioral sciences into combinations that will build the broad research competence required to investigate integrative and developmental functions of higher organisms and their organ systems. Dr. R. Burns Ross - (301) 496-7518

5. Medical Scientist Program

Interdisciplinary programs of integrated medical and graduate research training required for investigation of diseases in man. These programs assure highly selected trainees a choice of a wide range of pertinent graduate programs in the biological, chemical, physical, and social sciences combined with training in medicine leading to the combined

M.D.-Ph.D. degree. The proposed program should be flexible and adaptable in providing each trainee with the appropriate background in the sciences relevant to medicine and be rigorous enough to enable the individual to function independently in both basic research and clinical investigations. Dr. Vincent Price - (301) 496-7563

Postdoctoral Institutional National Research Service Awards

1. Basic Pathobiology

Advanced interdisciplinary training for post-Ph.D.'s from basic biological, biochemical, and biophysical sciences for research on fundamental problems of human disease; and training, for individuals holding a professional degree, that provides an in-depth knowledge of the principles and methods required for research at the cellular and molecular level in normal and diseased states. Dr. Edward Hampp - (301) 496-7563

2. Genetics (with emphasis on Medical Genetics)

Advanced and special research training in genetics, utilizing and applying the principles and fundamental mechanisms of genetics toward an understanding of human genetic disease. Trainees may be drawn from diverse biological and medical backgrounds for research with faculty representing various approaches to genetic research—ranging from biochemical genetics to human population genetics. Opportunities for training in medical genetics are considered desirable. Dr. Dorothea S. Miller - (301) 496-7137

3. Clinical Pharmacology

Advanced research training in clinical pharmacology. Individuals should receive experience in the methodology and conduct of clinical research to qualify them to investigate, in depth, the effects and the mechanisms of drug actions in humans. Trainees, who would usually have the M.D. degree, should have the opportunity to acquire fundamental scientific knowledge and research techniques in areas such as basic pharmacology, biochemistry, physiology, analytical methodology, and other biomedical subdisciplines. Dr. Sara Gardner - (301) 496-7181

4. Trauma and Burn Research

Multidisciplinary research training for postdoctoral scientists to enhance their capability of advancing our knowledge of the body's complex reactions to trauma and burn injuries. The supervisory staff should include trauma surgeons and/or burn specialists as well as basic scientists. Emphasis will be placed on basic training for at least two years within such departments as physiology, biochemistry, immunology, and microbiology. Dr. Emilie Black - (301) 496-7373

5. Anesthesiology

Research training support is offered to individuals with the M.D. degree who seek a better understanding of the fundamental mechanisms of anesthesia and pain and their effects on the body at the level of the organ systems as well as at the cellular and molecular levels. In order to achieve these goals, it is expected that trainees will spend at least two years in such basic science departments as physiology, pharmacology or biochemistry. Dr. Emilie A. Black - (301) 496-7373

INDIVIDUAL POSTDOCTORAL NATIONAL RESEARCH SERVICE AWARDS

The National Institute of General Medical Sciences is currently accepting applications from eligible individuals who seek biomedical research training in the areas specified below.

Information regarding dates of application and notification, tenure, stipends, eligibility, and payback requirements may be found in the NIH Guide for Grants and Contracts, Vol. 6, No. 2, January 12, 1977.

For additional general information about the individual National Research Service Awards, contact Dr. Roger Fuson, Fellowships Officer, National Institute of General Medical Sciences, Bethesda, Maryland 20014, telephone (301) 496-7368. For information specific to the listed program areas, call the indicated staff member.

Postdoctoral individual National Research Service Awards may be applied for in the following areas:

1. Cellular and Molecular Biology

Awards are provided to enable individuals holding the Ph.D. degree in the biological or physical sciences to acquire special advanced research training toward developing necessary cross-field knowledge for a research career in cell sciences—in areas such as membrane structure and function, cell motility, differentiation, enzyme catalysis and regulation, and proteins and other macromolecules, which are essential for an understanding of living systems at the cellular-molecular level. The fellowships enable individuals holding the M.D. degree to obtain the requisite background and skills in basic research to bring new knowledge at the subcellular and molecular level into medicine. Dr. Charles A. Miller - (301) 496-7021

2. Genetics (including Medical Genetics)

Awards are made for research training focusing on the principles and mechanisms of genetics. The aim is the further understanding of genetic processes in general and of human genetic disease. Applicants may propose research and study with investigators representing various approaches to genetics including biochemical, developmental, regulatory, population and clinical aspects of heredity. Dr. George W. Woolley - (301) 496-7137

3. Pharmacological Sciences (including Clinical Pharmacology)

Training should emphasize the acquisition of competence in the broad research on drug action and effects on cells, animals, and man. Proposals from individuals with either a Ph.D. or a professional degree may range from the chemical to the clinical level of study and include training opportunities in such areas as biochemistry, physiology, medicinal chemistry, genetics, and other cognate fields. Dr. Raymond Bahor - (301) 496-7707

4. Systems and Integrative Biology (Physiology and Bioengineering)

Support for research training is offered to individuals holding a Ph.D. or professional degree who seek to apply engineering, physical and/or mathematical principles to biological and medical problems. Support is also available to individuals seeking competence in the quantitative study of organ systems and integrated physiological functions of animals and man. Dr. R. Burns Ross - (301) 496-7518

5. Clinically Oriented Areas

Research training support is offered (1) to individuals with the M.D. degree who are preparing for careers in clinical research; emphasis will be placed on proposals incorporating at least two years of training within such basic science departments as biochemistry, genetics, microbiology, immunology, physiology, pharmacology, psychology, or biostatistics; (2) to individuals with the Ph.D. degree who seek competence to apply the knowledge and methods of basic biomedical disciplines to medical problems, usually in close collaboration with clinical scientists. The following areas are represented:

Pathobiology - Dr. Edward Hampp (301) 496-7563
Anesthesiology - Dr. Emilie Black (301) 496-7373
Trauma and Burn Research - Dr. Emilie Black (301) 496-7373
Clinical Laboratory Sciences - Dr. Robert Melville (301) 496-7081
Behavioral Sciences Related to Medicine - Dr. William Taylor (301) 496-7048
Epidemiology - Dr. Margaret Carlson (301) 496-7585

In addition, the National Institute of General Medical Sciences offers individual National Research Service Awards under its Minority Access to Research Careers (MARC) Program. For information, contact Mr. Elward Bynum, Director, MARC Program, National Institute of General Medical Sciences, Bethesda, Maryland 20014 (301) 496-7357.

NATIONAL RESEARCH SERVICE AWARDS FOR INSTITUTIONAL GRANTS

CORRECTION

NIH GUIDE FOR GRANTS AND CONTRACTS (January 12, 1977)

The research areas in which applications will be accepted for institutional National Research Service Awards was incorrectly listed for the National Institute of Neurological and Communicative Disorders and Stroke in Vol. 6, No. 2, page 8, January 12, 1977. Please substitute the research areas listed below.

1. Developmental Neurology
2. Neurobiology
3. Neuroimmunology
4. Neuropathology and/or Otopathology
5. Neurovirology
6. Sensory Physiology and Biophysics
7. Minority Programs in Neurosciences

Dr. Raymond Summers (301) 496-9236

Review and selection NRS grant applications will be evaluated by initial peer review groups at the NIH and are also subject to review and approval of the appropriate advisory council of the NIH whose activities relate to the research training proposed. The application will be evaluated on the basis of records and qualifications of participating faculty, the proposed research training objectives and program design, previous training record of the program and its ability to attract high caliber students, institutional commitment, facilities and environment, and relationship of the proposed program goals to need for research training in NIH program areas.

GENERAL PROVISIONS

Eligibility requirements Individuals appointed as trainees on the grant must be citizens or non-citizen nationals of the United States, or have been lawfully admitted to the United States for permanent residence and have in their possession a permanent visa at time of appointment. A non-citizen national is a person who although not a citizen of the United States, owes permanent allegiance to the United States. They are generally persons born in lands which are not States, but which are under United States sovereignty, jurisdiction, or administration (e.g. American Samoa). Individuals on temporary or student visas are not eligible.

Predoctoral trainees must have received an appropriate baccalaureate degree as of the date of appointment to the approved training program. An individual at the postdoctoral level must have received as of the date of appointment to the approved training program, a Ph.D., M.D., D.D.S., D.O., D.V.M., O.D., Sc.D., D.Eng., D.N.S., or equivalent domestic or foreign degree.

Stipends and other training costs Stipends and allowances requested will be in accordance with the following: For predoctoral, an annual stipend of $3,900 for individuals at all levels.

For postdoctorals, the stipend for the first year is determined by the number of years of prior relevant postdoctoral experience at time of appointment. Relevant experience may include research experience (including industrial), teaching, internship, residency, or other time spent in full-time pursuit of additional degrees or full-time studies in a health-related field at a level beyond that of the qualifying doctoral degree. The stipend for each additional year of support is based on the level for the first year plus $400 for each additional year under the National Research Service Award.

Tuition and travel may be requested. There is no allowance for dependents.

Postdoctoral Stipends

Years of Relevant Experience at Time of Initial Award	Year of Award		
	1st Year	2nd Year	3rd Year
0	$10,000	$10,400	$10,800
1	10,800	11,200	11,600
2	11,500	11,900	12,300
3	12,200	12,600	13,000
4	12,800	13,200	13,600
5 or more	13,200	13,600	14,000

APPENDIX B3.1

DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE
PUBLIC HEALTH SERVICE
ALCOHOL, DRUG ABUSE, AND MENTAL HEALTH ADMINISTRATION
ROCKVILLE, MARYLAND 20852

OFFICE OF THE ADMINISTRATOR

ANNOUNCEMENT

ALCOHOL, DRUG ABUSE, AND MENTAL HEALTH ADMINISTRATION

National Research Service Awards for Institutional Grants

July 1978

Subject to availability of funds and to periodic modification of research areas, applications for institutional research training grants will be accepted by ADAMHA under receipt dates of February 1, June 1, and October 1.

AUTHORITY AND PURPOSE: Under authority of Section 472 of the Public Health Service Act as amended (42 USC 2891-1), the Alcohol, Drug Abuse, and Mental Health Administration (ADAMHA) will award grants to eligible institutions to develop or enhance research training opportunities for individuals selected by them who are training for careers in specified areas of biomedical and behavioral research. (See Attachment for description of these areas.) Title 42 of the Code of Federal Regulations, Part 66, is applicable to these awards. *This announcement supersedes all previous program announcements, guidelines, or other communications regarding the ADAMHA National Research Service Awards program, except for the "Guidelines for National Research Service Awards" issued jointly by the National Institutes of Health, ADAMHA, and the Health Resources Administration. Should other supplementary guidelines be necessary in the future, they will be issued only by the Office of the Administrator, ADAMHA or by the Director of an Institute.*

LEVELS OF TRAINING: ADAMHA is redirecting the emphasis of support in its research training programs from predoctoral to postdoctoral support based on findings and recommendations from national manpower studies. While applications will be accepted for training of predoctoral and/or postdoctoral individuals, the highest priority for funding will be given to applications for postdoctoral training. Any request for support of predoctoral training must be accompanied by special justification in terms of manpower needs in the particular research area(s) to be encompassed by the proposed training program.

ELIGIBILITY REQUIREMENTS: Domestic public or non-profit private institutions may apply for institutional grants to support research training programs in areas of research specified in this announcement (see Attachment). The applicant institution must have, or be able to develop, the staff and facilities to provide the proposed research training in a suitable environment for performing high-quality work.

The training program director at the institution will be responsible for selection and appointment of individuals to receive National Research Service (NRS) Awards and for the overall direction of the research training program. The training program must provide opportunities for individual awardees selected by the institution to carry out supervised research in the specified areas with the primary objective of extending their skills and knowledge.

Individuals selected by the program director to be recipients of NRS Awards must be citizens or non-citizen nationals of the United States, or have been lawfully admitted to the United States for permanent residence and have in their possession a permanent visa at the time of appointment to the training program. Non-citizen nationals are persons born in lands which are not States, but which are under U.S. sovereignty, jurisdiction, or administration (e.g., American Samoa). Individuals on temporary or student visas are not eligible.

Predoctoral individuals selected to receive NRS Awards must have completed two or more years of graduate work at the time of appointment to the NRSA training program. Postdoctoral individuals selected to receive NRS Awards must have received a Ph.D., M.D., D.D.S., D.O., D.V.M., O.D., Sc.D., D.Eng., D.N.S., or equivalent domestic or foreign degree as of the date of appointment to the NRSA training program. National Research Service Awards are not made for study leading to the M.D., D.O., D.D.S., or other similar professional degrees, or for study which is part of residency training leading to a medical specialty.

STIPENDS AND OTHER TRAINING COSTS: The annual stipend for predoctoral individuals at all levels is $3,900.

For postdoctoral individuals the stipend for the first year is determined by the number of years of prior relevant postdoctoral experience at the time of appointment. Relevant experience may include research experience (including industrial), teaching, internship, residency, or other time spent in full-time pursuit of additional degrees or full-time studies in a health-related field at a level beyond that of the qualifying doctoral degree. The stipend for each subsequent year of support is based on the level of the first year plus $400 for each additional year under a National Research Service Award.

Postdoctoral Stipends

Years of Relevant Postdoctoral Experience at Time of Initial Appointment	YEAR OF AWARD		
	1st Year	2nd Year	3rd Year
0	$10,000	$10,400	$10,800
1	10,800	11,200	11,600
2	11,500	11,900	12,300
3	12,200	12,600	13,000
4	12,800	13,200	13,600
5 or more	13,200	13,600	14,000

The stipend is a pre-established level of support to help provide for the trainee's living expenses during the period of training. The stipend is not a payment for services performed. Trainees are not considered to be employees either of PHS or of their sponsoring institution.

Institutions may supplement stipends as necessary from institutional resources. No ADAMHA grant funds may be used for supplementation. No supplementation may be provided from other Federal funds unless explicitly authorized under terms of the specific program from which such funds are received.

In addition to stipends, the institution may request funds for tuition, fees and certain types of travel for trainees; actual indirect costs or 8% of allowable direct costs (whichever is less) to cover related institutional overhead; and up to 25% of the total award for other related costs (salaries, equipment, research supplies, etc.) which are deemed essential to carry out the program of training for the National Research Service Awardees appointed under the grant. Funds for such "other related costs" are intended to provide the institution with only partial support for the costs of developing or maintaining a high quality environment for the proposed research training and for meeting the costs of trainee research. Tuition at the postdoctoral level is limited to that required for specified courses.

PERIOD OF SUPPORT: Awards for institutional grants may be made for project periods of up to five years. Individuals appointed under institutional grants to receive National Research Service Awards may not receive support for more than three years in the aggregate. Any exception to the three year limit requires a waiver from the Director of the awarding Institute based on review of justification from the awardee and the program director for the institutional grant.

CONDITIONS OF AWARD: No trainee will be appointed unless he or she meets the eligibility requirements, and unless a completed Statement of Appointment Form and a signed Payback Agreement (indicating the individual's intent to meet the service or payback provisions required under the law and described in the subsequent paragraph) have been submitted to ADAMHA. Institutions shall notify prospective trainees of this provision prior to or at the time an appointment is offered. At the end of the total support period for an individual trainee, the institution must submit a Termination Notice form to ADAMHA. Failure to submit the required forms in a timely fashion may result in an expenditure disallowance. No funds for tuition, fees, or trainee travel costs may be provided from an institutional NRSA grant to, or on behalf of, any individual unless that individual is receiving a stipend under the NRSA grant.

Within two years after completion of NRSA support, individual recipients of NRS Awards are to engage, for a period equal to the period of support, in biomedical or behavioral research or teaching, or any combination thereof. When in academic employment, such research or teaching may be in any combination in accordance with the usual patterns of academic employment. Alternatively, if the Secretary, HEW, determines there are not suitable health research or teaching positions available to the individual, the following may be authorized: (1) If the individual is a physician, dentist, nurse, or other individual trained to provide health care directly to patients, the Secretary may authorize (a) service in the National Health Service Corps, (b) service in his or her specialty in a geographic area designated by the Secretary, or (c) service in his or her specialty in a health maintenance organization serving a medically underserved population; or, (2) If the individual who received the NRS Award is not trained to provide health care to patients, the Secretary may authorize the individual to engage in some other health-related activity. For each year for which an individual receives an NRS Award he or she shall (a) engage in twelve months of health research or teaching, (b) serve twelve months as a member of the National Health Service Corps, or (c) if authorized by the Secretary for one of the other alternatives, shall serve twenty months for each year of award.

For individuals who fail to fulfill their full service obligation, the United States is entitled to recover an amount equal to the total stipend received from the institutional grant, plus interest. The amount is computed in accordance with a formula which gives one-half credit to months actually served. Interest on the amount begins and is at the rate fixed by the Secretary of the Treasury considering private consumer rates which prevail on the date the United States becomes entitled to such amount. Financial payback must be completed within three years from that date.

By Federal Regulation, there are certain conditions under which the Secretary, HEW, may extend the period for undertaking service or for financial payback, permit breaks in service, or otherwise waive or suspend the payback obligation to an individual where enforcement of the obligation would involve extreme hardship or be against equity and good conscience.

National Research Service Awards provided to individuals under institutional grants are made for full-time research training. Awardees may utilize some of their time in course studies and clinical duties if such work is closely related to and necessary for the research training experience. No appointment for less than nine months may be made without the prior approval of the ADAMHA awarding unit.

An NRS Award recipient may not hold another federally sponsored fellowship or training award concurrently with a National Research Service Award. An awardee may, however, accept concurrent educational remuneration from the Veterans Administration (e.g., G.I. Bill) and loans from Federal funds.

TAXABILITY OF STIPENDS: The Internal Revenue Service has ruled that the NRS Awards are made primarily for the benefit of the grantor and are accordingly not excludable from gross income as fellowships. (IRS Bulletin No. 1977-36, dated September 6, 1977.)

REVIEW PROCESS AND REVIEW CRITERIA: Applications for institutional grants are evaluated for scientific/technical merit by ADAMHA initial review groups and also are subject to the review and recommendations of the appropriate ADAMHA Advisory Council. Applications will be evaluated on the basis of records and qualifications of participating faculty, the proposed research objectives and program design, the criteria to be employed in selecting individuals to receive NRS Awards, previous training record of the program and its ability to attract high caliber students, institutional commitments, facilities and environment, and relationship of the proposed program goals to need for research training in ADAMHA program areas.

FUNDING CRITERIA: Awarding components select applications for funding primarily on the basis of merit review results, but other factors which may be considered include availability of funds, priority on postdoctoral support, program priorities as indicated in the research areas specified in this announcement, and grants policy requirements.

APPLICATION RECEIPT AND REVIEW SCHEDULE:

Receipt Dates	Initial Review Group Meeting	Council Meeting	Earliest Possible Start Date
February 1	June	October	December 1
June 1	November	February	April 1
October 1	March	May	July 1

APPLICATION: Eligible institutions desiring to request support under this program are encouraged to review the specified research areas (see Attachment). Application must be made on Form PHS 6025. Application forms are to be submitted to the Division of Research Grants, 5333 Westbard Avenue, Bethesda, Maryland 20014. Requests for application forms and other inquiries regarding the ADAMHA National Research Service Awards program should be addressed as follows:

General Mental Health:

Grants Management Officer
National Institute of Mental Health
5600 Fishers Lane
Rockville, Maryland 20857

Alcohol Abuse and Alcoholism:

Grants Management Officer
National Institute on Alcohol Abuse and Alcoholism
5600 Fishers Lane
Rockville, Maryland 20857

Drug Abuse:

Grants Management Officer
National Institute on Drug Abuse
5600 Fishers Lane
Rockville, Maryland 20857

NOTIFICATION OF FINAL ACTION: Applicants are notified by the awarding unit of the final action on the application by an award notice and/or by a letter.

The National Institutes of Health and the Health Resources Administration, Division of Nursing, also provide support through National Research Service Awards. For information and application forms, contact the appropriate agency.

APPENDIX B3.2

DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE
PUBLIC HEALTH SERVICE
ALCOHOL, DRUG ABUSE, AND MENTAL HEALTH ADMINISTRATION
ROCKVILLE, MARYLAND 20852

OFFICE OF THE ADMINISTRATOR

ANNOUNCEMENT

ALCOHOL, DRUG ABUSE, AND MENTAL HEALTH ADMINISTRATION

National Research Service Awards for Individual Fellows

July 1978

> *Subject to availability of funds and to periodic modification of research areas, applications for individual fellowships will be accepted by ADAMHA under receipt dates of February 1, June 1, and October 1.*

AUTHORITY AND PURPOSE: Under authority of Section 472 of the Public Health Service Act as amended (42 USC 289l-1), the Alcohol, Drug Abuse, and Mental Health Administration (ADAMHA) provides National Research Service Awards to individuals for research training experiences in specified areas of biomedical and behavioral research. (See Attachment for description of these areas.) Title 42 of the Code of Federal Regulations, Part 66, is applicable to these awards. *This announcement supersedes all previous program announcements, guidelines, or other communications regarding the ADAMHA National Research Service Awards program, except for the "Guidelines for National Research Service Awards" issued jointly by the National Institutes of Health, ADAMHA, and the Health Resources Administration. Should other supplementary guidelines be necessary in the future, they will be issued only by the Office of the Administrator, ADAMHA or by the Director of an Institute.*

LEVELS OF TRAINING: ADAMHA is redirecting the emphasis of support in its research training programs from predoctoral to postdoctoral support based on findings and recommendations from national manpower studies. While applications will be accepted for predoctoral or postdoctoral training, the highest priority will be given by ADAMHA to applicants for postdoctoral training.

ELIGIBILITY REQUIREMENTS: Applicants must be citizens or non-citizen nationals of the United States, or have been lawfully admitted to the United States for permanent residence and have in their possession a permanent visa at time of application. Non-citizen nationals are persons born in lands which are not States, but which are under U.S. sovereignty, jurisdiction, or administration (e.g., American Samoa). Individuals on temporary or student visas are not eligible.

A predoctoral applicant must have completed two or more years of graduate work as of the proposed activation date of the fellowship and have a doctoral prospectus. A postdoctoral applicant must have received a Ph.D., M.D., D.D.S., D.O., D.V.M., O.D., Sc.D., D.Eng., D.N.S., or equivalent degree as of the proposed activation date of the fellowship.

Applicants must propose research training in specified research areas (see Attachment). The program offers an opportunity to scientists, research clinicians, etc., to carry out supervised research in these areas, with the primary purpose of extending their skills and knowledge. National Research Service (NRS) Awards are not made for study leading to the M.D., D.O., D.D.S., or other similar professional degrees, or for study which is part of residency training leading to a medical specialty.

Prior to formal submission, an applicant must arrange for appointment to an appropriate institution and acceptance by a sponsor who will supervise the research training experience. The institutional setting may be a domestic or foreign non-profit private or public institution (including ADAMHA or NIH) that has the staff and facilities to provide the proposed research training in a suitable environment.

With adequate justification, an individual may request support for research training abroad. Such applicants are required to provide detailed information on the unique facilities and/or training opportunity at the proposed location.

ANNUAL STIPENDS AND ALLOWANCES: The annual stipend for predoctoral individuals at all levels is $3,900.

For postdoctoral individuals the stipend for the first year is determined by the number of years of prior relevant postdoctoral experience at the time of award. Relevant experience may include research experience (including industrial), teaching, internship, residency, or other time spent in full-time pursuit of additional degrees or full-time studies in a health-related field at a level beyond that of the qualifying doctoral degree. The stipend for each subsequent year is based on the level of the first year plus $400 for each additional year under a National Research Service Award.

Postdoctoral Stipends

Years of Relevant Postdoctoral Experience at Time of Award	YEAR OF AWARD 1st Year	2nd Year	3rd Year
0	$10,000	$10,400	$10,800
1	10,800	11,200	11,600
2	11,500	11,900	12,300
3	12,200	12,600	13,000
4	12,800	13,200	13,600
5 or more	13,200	13,600	14,000

The stipend is a pre-established level of support to help provide for the fellow's living expenses during the period of training. The stipend is not a payment for services performed. Fellows supported under individual awards are not considered to be employees either of PHS or of their sponsoring institution. For fellows sponsored by domestic non-Federal institutions, the payment of the stipend will be made through the sponsoring institution. For fellows sponsored by Federal institutions, the stipend payment will be made directly by U.S. Treasury check.

Institutions may supplement stipends as necessary from institutional resources. No ADAMHA grant funds may be used for supplementation. No supplementation may be provided from other Federal funds unless explicitly authorized under terms of the specific program from which such funds are received.

Funds will not be provided to cover the cost of travel between the fellow's place of residence and the training institution, except (1) the institution may authorize from the institutional allowance a one-way travel allowance in a case of extreme need or hardship; or, (2) the ADAMHA awarding component may authorize the cost of a single roundtrip economy or coach ticket to the training site when the approved training is at a foreign site or institution.

Upon request, ADAMHA will provide funds of up to $3,000 per 12-month period to the non-Federal sponsoring institution to help defray such trainee expenses as tuition and fees, research supplies, equipment, travel to scientific meetings, and related items. An allowance of up to $1,000 per 12-month period is available for the fellow sponsored by a Federal laboratory for scientific meeting travel expenses and appropriate medical insurance. When an individual award is for approved training involving research at sites other than the sponsoring institution, an allowance may be requested to help support field costs of the research as well as travel.

The sponsoring institution shall be entitled to the approved institutional allowance only upon official activation of the award. However, if an individual fellow is not enrolled or engaged in training for more than six months of the year of support for which the award was made, one-half of the allowance must be refunded to the Public Health Service.

PERIOD OF SUPPORT: No individual may receive more than three years of support in the aggregate under the National Research Service Award program. Any exception to this requires a waiver from the Director of the awarding Institute based on review of justification from the Awardee and his or her sponsor. Although fellowships are awarded for 12-month periods, assurances may be given by the awarding unit for continued support beyond the first year provided progress is satisfactory and funds are available.

ACTIVATION DATE: An awardee has until the end of twelve months from the issue date on the award notice to activate a new award.

CONDITIONS OF AWARD: No funds will be made available to an individual unless he or she has signed and submitted a Payback Agreement indicating his or her intent to meet payback provisions required under the law. At the end of the total support period, the individual fellow must submit a Termination Notice form to ADAMHA. Failure to submit the required forms in a timely fashion may result in collection actions.

Within two years after completion of NRSA support, recipients of NRS Awards are to engage for a period equal to the period of support in biomedical or behavioral research or teaching or any combination thereof. When in academic employment, such research or teaching may be in any combination in accordance with the usual patterns of academic employment. Alternatively, if the Secretary, HEW, determines that there are no suitable health research or teaching positions available to the individual, the following may be authorized: (1) If the individual is a physician, dentist, nurse, or otherwise trained to provide health care directly to patients, the Secretary may authorize (a) service in the National Health Service Corps, (b) service in his or her specialty in a geographic area designated by the Secretary, or (c) service in his or her specialty in a health maintenance organization serving a medically underserved population; or (2) If the individual who received the NRS Award is not trained to provide health care to patients, the Secretary may authorize the individual to engage in some other health-related activity. For each year for which an individual receives an NRS Award he or she shall (a) engage in twelve months of health research or teaching, (b) serve twelve months as a member of the National Health Service Corps, or (c) if authorized by the Secretary for one of the other alternatives, shall serve twenty months for each year of award.

For individuals who fail to fulfill their full service obligation, the United States is entitled to recover an amount equal to the stipend received from the ADAMHA National Research Service Awards, plus interest. The amount is computed in accordance with a formula which gives one-half credit to months actually served. Interest on the amount begins and is at the rate fixed by the Secretary of the Treasury considering private consumer rates which prevail on the date the United States becomes entitled to such amount. Financial payback must be completed within three years from that date.

By Federal Regulation, there are certain conditions under which the Secretary, HEW, may extend the period for undertaking service or for financial payback, permit breaks in service, or otherwise waive or suspend the payback obligation to an individual where enforcement of the obligation would involve extreme hardship or would be against equity and good conscience.

Awards are made for full-time research training. Fellows may utilize some of their time in course studies and clinical duties if such work is closely related to and necessary for their research training experience.

An NRS Award recipient may not hold another federally sponsored fellowship concurrently with a National Research Service Award. An NRSA recipient may, however, accept concurrent educational remuneration from the Veterans Administration (e.g., G.I. Bill) and loans from Federal funds. Fellows are not entitled to vacations, as such, although fellows at academic institutions may take the holidays at Christmas, in the spring, etc., and the short period between semesters and quarters. The time between a summer session and a fall semester is considered an active part of the training period. Those at non-academic institutions are entitled to the normal holiday and vacation periods of the institutions.

TAXABILITY OF STIPENDS: The Internal Revenue Service has ruled that the NRS Awards are made primarily for the benefit of the grantor and are accordingly not excludable from gross income as fellowships. (IRS Bulletin No. 1977-36, dated September 6, 1977.)

REVIEW PROCESS AND REVIEW CRITERIA: Applications will be evaluated for scientific/technical merit by ADAMHA initial review groups and are also subject to the review and recommendations of the appropriate ADAMHA Advisory Council. The application will be evaluated on the basis of past academic and research records, the research training proposal, the sponsor's general qualifications, the training environment, the applicant's research goals in terms of specified priority areas, publications, reference reports and other relevant information.

FUNDING CRITERIA: Awarding components select applications for funding primarily on the basis of merit review results, but other factors which may be considered include availability of funds, priority on postdoctoral support, program priorities as indicated in the research areas specified in this announcement, and grants policy requirements.

APPLICATION RECEIPT AND REVIEW SCHEDULE:

Receipt Dates	Initial Review Group Meeting	Council Meeting	Earliest Possible Start Date
February 1	June	October	December 1
June 1	November	February	April 1
October 1	March	May	July 1

APPLICATION INFORMATION: Individuals are encouraged to review the eligibility criteria and specified research areas in this announcement before requesting application kits. The applicant must submit (1) an application (PHS 416-1), according to instructions provided by ADAMHA; (2) a signed assurance indicating that the service or financial payback requirement will be complied with, if an award is made; and (3) if a non-citizen, a notarized statement of permanent residence. A complete application also includes the sponsor's Facilities and Commitment Statement (PHS 416-2) which must be with the application at the time it is submitted. In addition, an applicant must arrange for the submission of reference reports (PHS 416-3) on his or her behalf. Application forms are to be submitted to the Division of Research Grants, 5333 Westbard Avenue, Bethesda, Maryland 20014.

An individual may not have more than one competing application pending review concurrently in the National Research Service Award program.

Requests for application forms and other inquiries regarding the ADAMHA National Research Service Awards for individual fellows should be addressed as follows:

General Mental Health:

Grants Management Officer
National Institute of Mental Health
5600 Fishers Lane
Rockville, Maryland 20857

Alcohol Abuse and Alcoholism:

Grants Management Officer
National Institute on Alcohol Abuse and Alcoholism
5600 Fishers Lane
Rockville, Maryland 20857

Drug Abuse:

Grants Management Officer
National Institute on Drug Abuse
5600 Fishers Lane
Rockville, Maryland 20857

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NOTIFICATION OF FINAL ACTION: An applicant is notified by the awarding unit of the final action on the application by an award notice or by a letter.

> The National Institutes of Health and the Health Resources Administration, Division of Nursing, also provide support through National Research Service Awards. For information and application forms, contact the appropriate agency.

APPENDIX B3.3

July 1978

ATTACHMENT

ALCOHOL, DRUG ABUSE, AND MENTAL HEALTH ADMINISTRATION

National Research Service Awards Program
Research Areas for Individual and Institutional Awards

Research areas are described below in which the three Institutes of the Alcohol, Drug Abuse, and Mental Health Administration will offer awards. These areas are defined in terms of substantive and problem areas for which research manpower is needed, and examples are included of professions, disciplines, and approaches to be emphasized. Presentation of research areas is not in order of priority.

National Institute on Alcohol Abuse and Alcoholism

The research training efforts of the National Institute on Alcohol Abuse and Alcoholism are derived from the research program of the Institute which focuses on the multiple determinants of alcoholism and on the treatment and rehabilitation of alcoholics and alcohol abusers. The research program has as its main goals the reduction of the incidence and prevalence of alcohol abuse and alcoholism, and the reduction of the morbidity and mortality associated with alcohol use, abuse and alcoholism. Research training support may be obtained for the totality of research and disciplinary areas ranging from basic biochemical and biomedical research to psychosocial and anthropological research. At present, however, the highest priority for funding under the NRSA program is in social, behavioral, clinical, and treatment research training involving such disciplines as sociology, psychology, anthropology, epidemiology, health economics, and behavioral genetics. The specific foci of the program are indicated below.

1. Development of Behavior

Research training is provided for the study of processes relating to the development of alcoholism and alcohol abuse. These studies may include examination of basic biological processes; however, priority will be given to applications in the psycho-social disciplines. Of particular interest at the present time are studies of genetic factors in the development of alcoholism; social factors which may influence use of alcohol, particularly in youths; and the development of alcohol problems.

2. Disorders and Maladaptive Behavior

The NIAAA emphasizes research training related to the problems of alcoholism and excessive alcohol use, including related medical and behavior disorders. Proposals are invited for research training in the etiology, diagnosis, treatment, epidemiology, and prevention of alcoholism and alcohol-related problems. Eligible training proposals may be concerned with such issues as early differential diagnosis of alcoholism, both from other related diseases as well as defining better the distinction between chronic heavy drinking and alcoholism itself; association between alcohol and other disorders such as heart disease, cancer or depression; efficacy of new and established treatments for various subpopulations; fetal alcohol syndrome; occupational alcoholism; and improved prevention strategies.

3. Social Issues Relating to Alcoholism and Alcohol Problems

The NIAAA places high priority on minorities, youth, and women, and seeks research training applications related to these populations. Areas of interest include, for example, cultural patterns in use and abuse of alcohol, special service needs and problems of these populations.

Research training proposals may address legal, political science, and economic aspects of various social issues related to alcoholism, in addition to psychological and sociological aspects. Examples of areas for which research training support might be provided include the effects of legislation (drinking-driving laws, alcoholic beverage control laws, drinking age, etc.) on patterns and trends in occurrence of alcoholism.

4. Services Research

There is need for highly qualified researchers to develop and apply scientific methodology to problems connected with developing and improving delivery systems for alcoholism treatment, rehabilitation, and prevention services. Encouraged are applications focused on research training in: the determination of the effectiveness of various services in meeting the needs of particular populations and communities (for example, minorities or occupational alcoholism programs); epidemiologic techniques as applied to alcoholism service delivery systems, to elucidate, for example, the effects of social and economic factors on the utilization of services; and methods for researching needs assessment and planning approaches, organization, staffing, management, and financing of alcoholism services as factors affecting, for example, the standards and quality of care, utilization, and cost effectiveness.

National Institute on Drug Abuse

1. Development of Behavior

Research training will emphasize the development of scientific expertise in behavioral pharmacology, molecular pharmacology, neuropharmacology, immunopharmacology, and endocrine pharmacology as these disciplines relate to mechanisms underlying the development of substance abuse behaviors. There is also a need to train scientific personnel for basic and applied research in the following areas: analytical chemistry, chemical synthesis, pharmacokinetics, and quantitative structure activity relationships. Additional expertise is needed in the areas of behavioral genetics and pharmacogenetics as they relate to the addictive process. Specialists are also sought in human personality formation, psychological development, the socialization process, and their interrelationships with addictive life styles.

2. Disorders and Maladaptive Behavior

There is need to develop research expertise on complex behavioral and societal factors involved in the etiology and epidemiology of drug absue and related maladaptive behavior. Emphasis will be placed on providing interdisciplinary training and training of behavioral and social scientists in experimental and field analysis of social behavior. Particular emphasis is placed on training of behavioral and social scientists who have an interest in research on substance abuse and its sequelae and analyzing life style factors in clinical and naturalistic settings. Experimental and methodological expertise is needed to develop new measures of incidence, prevalence, and usage patterns of abuse substances. Training also is needed to enable scientists to assess the safety and efficacy of new pharmacological and innovative behavioral treatment modalities and to develop and assess, within both clinical and naturalistic settings, new modalities for treating drug and substance abuse behavior among various population groups. Emphasis will be given to extending research methodological skills of clinicians in the fields of pharmacology, behavioral pharmacology, and treatment of substance abuse.

3. Social Issues Relating to Alcohol, Drug Abuse, and Mental Health

Applications for training are encouraged with respect to variations in drug abuse problems among special population groups at risk. Emphasis will be on interdisciplinary research training for social, psychological, and medical scientists. Trained personnel are also needed to conduct research employing anthropological methods for the study of drug use and abuse in different cultures and groups.

4. Services Research

Training is needed for social and behavioral scientists to design and execute evaluations of current programs of treatment or prevention.

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National Institute of Mental Health

The research objective of NIMH is to better understand the determinants of human behavior particularly relevant to mental illness and mental health. Highly trained researchers are required to produce the new knowledge that is needed. Manpower needs in research related to mental health problems are in four general areas: (1) the processes underlying the development and variation of behavior; (2) mental disorders and maladaptive behavior; (3) social problems related to mental health; and (4) mental health services research. Support is available in these areas as they are relevant to the NIMH mission.

1. Development of Behavior

As behavior is determined by biological, psychological, and sociocultural factors, proposals will be accepted for research training in disciplinary or interdisciplinary settings concerned with these determinants. The development and maintenance of mental health throughout the entire lifespan of the individual is of concern, with special focus on childhood, adolescence, and old age.

Applications concerned with such areas as behavioral genetics, psychobiological aspects of maturation, sensory and motor processes, affective and cognitive processes, and biological bases of social behavior and social organization are eligible for support. The influence of psychotropic drugs on these processes and the mechanisms of action are of special concern to NIMH. Proposals will be considered also in such areas as development of the brain and the central nervous system, at all levels of organization, as they relate to behavior.

Proposals are also invited in the areas of social and cognitive development, perception, memory, and language, particularly as they relate to personality research. Other relevant topics include cultural norms of behavior, social structure, social interaction, socio-cultural factors of change and stress, human adaptation, socialization, family dynamics, and in general the effects of socio-cultural environment on the developmental processes of persons, families, and groups. Processes involving adaptive or "normal" behavior are as much of concern as those involving maladaptive or "abnormal" behavior.

2. Mental Disorders and Maladaptive Behavior

The mission of the NIMH includes concern for both mental health and mental illness. Proposals are invited for research training in the etiology, diagnosis, psychopathology, treatment, epidemiology, and the prevention of mental disorders and maladaptive behavior in homogeneous and heterogeneous cultural settings.

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Eligible training proposals may be concerned with organic and functional disorders involving the nervous system and behavior in general. Areas of special importance are child mental health problems, mental disorders in later life, schizophrenia, depression and suicide, psychosomatic disorders, and psychoneuroses. Applications are invited for research training to identify life events associated with risk populations and the genetics of mental disorders. Of particular interest is training which combines basic biological, psychological, or socio-cultural research with clinical research training in mental disorders and maladaptive behavior. Research training concerned with measurement in the community of dimensions and distribution of mental disorders in terms of incidence, prevalence, and mortality, and an understanding of the factors associated with differential distribution is encouraged.

3. Social Problems Related to Mental Health

Applications are sought for research training in several social problem areas as they relate to mental health: (1) understanding crime and delinquency, individual violence, and law/mental health interactions, and evaluating community-based treatment programs for offenders; (2) understanding the relationship between the conditions of urban life, the functioning of communities and families, and the well-being and mental health of the individual; problem areas of special interest are the work situation, economic change, informal helping networks and alternative social forms; (3) understanding minority group concerns including their interest in mental health services, research on planning for the improvement of such services to minority groups, and understanding institutional racism and evaluating intervention programs to alleviate it; and (4) understanding the social and other conditions which encourage sexual attacks; the impact of rape on the victim and the family of the victim; evaluating the effectiveness of laws to prevent and control rape; evaluating the effectiveness of programs to assist the victim and the family of the victim, and programs to treat offenders.

Training in the area of social problems research is often multidisciplinary in nature. It covers a broad range of research problems, including basic studies of human behavior, intervention studies concerned with meeting special human needs, and studies on the overall improvement of mental health and social systems. Such problems can be addressed from the level of individual behavior and needs on the one hand, to the level of social institutions and their interactions on the other hand.

4. Mental Health Services Research

A major task for the research community is the development of a pool of highly qualified researchers trained to develop, apply, and refine appropriate scientific methodologies for the study of problems related to the delivery of mental health services.

Accordingly, applications are sought for research training proposals designed to strengthen and expand the capabilities of researchers for work on theoretical and methodological problems in this area.

Encouraged are applications focused on training in: epidemiologic techniques as applied to mental health service systems, to elucidate, for example, the effects of social and economic factors on utilization of services; methods for researching needs assessment and planning approaches, organization, staffing management, and financing of mental health services as factors affecting, for example, the standards and quality of care, utilization and cost effectiveness; and methods for evaluating the effectiveness of various services in meeting the needs of particular populations or communities.

The general research areas described above (development of behavior, mental disorders and maladaptive behavior, social problems related to mental health and mental health services research) require the mobilization of both disciplinary and interdisciplinary approaches. Accordingly. the Institute provides support for research training which addresses the problems and priorities discussed above through such disciplines as the following:

Biological Sciences:

This area consists primarily of:

- Behavioral Genetics
- Biological Anthropology
- Neurobehavioral Sciences
    - Neuroanatomy
    - Neurophysiology
    - Neuropsychology
    - Neuroendocrinology
    - Neurochemistry
- Psycho-Neuropharmacology
- Ethology

Psychological Sciences:

This cluster consists primarily of:

- Child and Developmental (life span)
- Social, Environmental, and Ecological
- Sensory Processes, Perception, and Cognition
- Human Learning and Performance
- Comparative, Ethological, and Animal Behavior
- Physiological and Biopsychology
- Experimental Psychopathology and Personality
- Evaluation Research Methodology

Social Sciences:

This area consists primarily of:

- Cultural Anthropology
- Sociology and Social Psychology
- Economics
- Political Sciences
- Epidemiology

Clinical Investigators

Research training support is also available to train individuals to become or to enhance their skills as clinical investigators in the disciplines and substantive areas described above. Clinical investigators are those individuals with a doctoral or equivalent professional degree in a clinical health profession (such as medicine, clinical psychology, nursing, or social work) who are trained to conduct biological, psychological or social science investigations.

APPENDIX B4.1

NATIONAL RESEARCH SERVICE AWARDS

Institutional Grants

Public Health Service Act, Section 472

DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE PUBLIC HEALTH SERVICE
HEALTH RESOURCES ADMINISTRATION BUREAU OF HEALTH MANPOWER DIVISION OF NURSING HYATTSVILLE, MD. 20782

National Research Service Awards (Institutional Grants) may be provided to eligible institutions to develop or enhance postdoctoral research training opportunities for individuals, selected by the institutions, who are interested in careers in nursing research and related behavioral and biomedical research. Awards are contingent upon favorable review and the availability of funds.

PURPOSE: To extend research training opportunities in nursing and health-related sciences through the support of institutions that offer exceptional training opportunities in selected areas of study.

CONDITIONS OF AWARD:

Full-time Study: Appointments are made for full-time training in research.

Payback Provisions: Trainees must sign Payback Agreement indicating intent to meet the service or payback provisions required under the law.

PERIOD OF SUPPORT: Institutional grant awards may be made for project periods of up to 5 years.

No individual may receive more than 3 years of support in the aggregate under a National Research Service Award.

PROVISIONS: Predoctoral stipends are $3,900 per annum.

Postdoctoral stipends begin at $10,000 per annum and are determined by the number of years of relevant postdoctoral experience at the time of the award.

Institution will receive, upon request, training allowance to include tuition and fees and certain other costs essential to carry out the training program.

ELIGIBILITY: Nonprofit private or non-Federal public institutions in the United States must have the staff and facilities required for the proposed programs.

Trainees must be (1) citizens of the U.S. or have been lawfully admitted for permanent residence (individuals on temporary or student visas are not eligible); (2) registered professional nurses with active license and a baccalaureate and/or a master's degree in nursing.

Postdoctoral trainees must have received a doctoral degree as of the date of appointment to the program, in an area relevant to the proposed research.

APPLICATION PROCEDURE: Applicants are urged to contact the Nursing Research Branch for consultation before completing applications (telephone 301-436-6204). Application kits may be obtained from:

Nursing Research Branch
Division of Nursing, BHM, HRA
Center Bldg., Room 3-50
3700 East-West Highway
Hyattsville, Maryland 20782

DEADLINE DATES FOR RECEIPT OF APPLICATIONS: February 1, June 1, October 1.

SELECTION OF AWARDEES: Institutional Grant applications are subject to both peer review for scientific merit and programmatic merit and to final review by the National Advisory Council on Nurse Training.

March 1978

APPENDIX B4.2

NATIONAL RESEARCH SERVICE AWARDS

Predoctoral and Postdoctoral Nurse Fellowship Program

Public Health Service Act, Section 472

DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE   PUBLIC HEALTH SERVICE
HEALTH RESOURCES ADMINISTRATION BUREAU OF HEALTH MANPOWER DIVISION OF NURSING HYATTSVILLE, MD. 20782

National Research Service Awards (Nurse Fellowships) may be provided to individual nurses for predoctoral and postdoctoral research training in specified areas of nursing and in the biomedical and behavioral fields important to nursing for periods up to three years. Awards are contingent upon favorable review and the availability of funds.

PURPOSES: (1) To increase the opportunities for qualified nurses to engage in full-time graduate study and research training; (2) to prepare professional nurses to conduct independent research, collaborate in interdisciplinary research, and stimulate and guide others in nursing research; (3) to promote the availability and utilization of nurses with research training in nursing and/or the basic sciences to function as faculty in schools of nursing at undergraduate and graduate levels; and (4) to prepare nurses to conduct scientific inquiry in disciplines that have significance for nursing theory and practice.

CONDITIONS OF AWARD:

Full-time Study: Appointments are made for full-time training in research.

Payback Provisions: Trainees must sign Payback Agreement indicating intent to meet the service or payback provisions required under the law.

PERIOD OF SUPPORT: No individual may receive more than 3 years of support in the aggregate under a National Research Service Award.

PROVISIONS: Predoctoral stipends are $3,900 per annum.

Postdoctoral stipends begin at $10,000 per annum and are determined by the number of years of relevant postdoctoral experience at the time of the award.

The sponsoring institution will receive upon request an institutional allowance of $3,000 per annum to help defray such expenses as tuition, fees, etc.

ELIGIBILITY: Applicants must be registered professional nurses with active license and either a baccalaureate and/or a master's degree in nursing.

Applicants for postdoctoral study must have received a Ph.D., D.N.S., Sc.D., or equivalent degree prior to the beginning date of the proposed fellowship.

Applicants must be citizens or have been lawfully admitted to the United States for permanent residence and have in their possession a permanent visa at the time of application. Individuals on temporary or student visas are not eligible.

APPLICATION PROCEDURE: Applicants should request further information and/or kits from:

Nursing Research Branch
Division of Nursing, BHM, HRA
Center Bldg., Room 3-50
3700 East-West Highway
Hyattsville, Maryland 20782

DEADLINE DATES FOR RECEIPT OF APPLICATIONS: February 1, June 1, and October 1.

SELECTION OF AWARDEES: Applications will be evaluated by initial scientific review groups and are also subject to review and action by the National Advisory Council on Nurse Training.

March 1978

APPENDIX C

CONFERENCES

APPENDIX C1

NATIONAL RESEARCH COUNCIL
COMMISSION ON HUMAN RESOURCES

2101 Constitution Avenue Washington, D. C. 20418

COMMITTEE ON A STUDY OF NATIONAL NEEDS FOR
BIOMEDICAL AND BEHAVIORAL RESEARCH PERSONNEL

Meeting of the Ad Hoc Group on
Veterinary Research Personnel

April 20, 1978

Room 600B
Joseph Henry Bldg.

Agenda

I. Opening Remarks
  (a) Study of National Needs for Biomedical and Behavioral Research Personnel: Dr. Pahl
  (b) Analytic Studies of Veterinary Research Personnel--A Progress Report: Dr. Clarkson

II. Objectives and Expectations for Meeting: Dr. Clarkson

III. The AVMA Manpower Study: Dr. Decker
(Dr. Melby,
Dr. Cornelius)

IV. Proposed Study by Committee on Veterinary Medical Sciences: Dr. Parker

V. Disincentives to Research Careers in Veterinary Medicine

VI. Contribution to 1978 Report (NRSAA)

Attendance

Dr. Thomas Clarkson, Wake Forest University
Dr. Charles Cornelius, University of Florida
Dr. Winston M. Decker, American Veterinary Medical Association
Dr. W. Jean Dodds, New York State Department of Health
Dr. Charles McPherson, National Institutes of Health
Dr. Edward C. Melby, Jr., Cornell University
Dr. Albert E. New, National Cancer Institute
Dr. Henry S. Parker, National Research Council

NRSAA Staff
Ms. Kay Harris, Administrative Associate
Dr. Samuel S. Herman, Executive Secretary of the Panel on Clinical Sciences
Dr. Herbert B. Pahl, Staff Director
Mr. Allen M. Singer, Project Director

The National Research Council is the principal operating agency of the National Academy of Sciences and the National Academy of Engineering to serve government and other organizations

APPENDIX C2

NATIONAL RESEARCH COUNCIL
COMMISSION ON HUMAN RESOURCES

2101 Constitution Avenue Washington, D. C. 20418

COMMITTEE ON A STUDY OF NATIONAL NEEDS FOR
BIOMEDICAL AND BEHAVIORAL RESEARCH PERSONNEL

Meeting of the
Work Group on Dental Research Personnel Needs
of the
Panel on Clinical Sciences

May 11, 1978

Room 800
Joseph Henry Bldg.

Agenda

I. Study of National Needs for Biomedical and Behavioral Research Personnel: Dr. Herman

II. Purpose and Objectives of Meeting: Dr. Goldhaber

III. AADS Data Base: Dr. Kinsey

IV. Study Methodologies: Mr. Singer

V. Long-term Data Needs and Analytic Approaches: Dr. Goldhaber

VI. Statement for 1978 Report

Attendance

Dr. Paul Goldhaber (Chairman), Harvard School of Dental Medicine
Dr. Harold M. Fullmer, University of Alabama in Birmingham
Dr. T. J. Ginley, National Association for Dental Research
Dr. Daniel B. Green, National Association for Dental Research
Dr. Ralph Kaslick, Fairleigh Dickinson University
Dr. Richard B. Kinsey, American Association of Dental Schools
Dr. Harold Loe, University of Connecticut
Dr. William D. McHugh, Eastman Dental Center and University of Rochester School of Medicine and Dentistry
Dr. Coenraad F. A. Moorrees, Forsyth Dental Center
Dr. Anthony Rizzo, National Institute of Dental Research
Dr. Robert Schuellein, National Institute of Dental Research

NRSAA Staff
Dr. Samuel S. Herman, Executive Secretary of the Panel of Clinical Sciences
Dr. Herbert B. Pahl, Staff Director
Mr. Allen M. Singer, Project Director

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APPENDIX C3

NATIONAL RESEARCH COUNCIL
COMMISSION ON HUMAN RESOURCES

2101 Constitution Avenue Washington, D. C. 20418

COMMITTEE ON A STUDY OF NATIONAL NEEDS FOR
BIOMEDICAL AND BEHAVIORAL RESEARCH PERSONNEL

PROGRAM FOR PUBLIC HEARING

February 9, 1978

Auditorium, National Academy of Sciences

8:00 a.m.	REGISTRATION	
9:00 "	INTRODUCTORY REMARKS Dr. Henry Riecken, Chairman	
	GUIDELINES FOR PARTICIPANTS Dr. Herbert B. Pahl, Staff Director	

SESSION I

9:10 a.m.	Warren K. Ashe	Howard University, College of Medicine
9:22 "	Benson Penick	Benson Penick & Associates
9:34 "	Russell Dynes/Paul Williams	American Sociological Association
9:46 "	Jonas Richmond	American Society of Biological Chemists
9:58 "		
10:10 "	Geoffrey Fisher	University of Minnesota
10:22 "	Oscar Barbarin	Association of Black Psychologists
10:34 "	COFFEE	

SESSION II

10:49 "	Lilli Hornig (represented by Leila Young)	NAS Committee on the Education and Employment of Women in Science and Engineering
11:01 "	Sheldon Murphy	University of Texas Medical School
11:13 "	Bela Maday	University of Virginia-Charlottesville
11:25 "	David Ricks	University of Cincinnati
11:37 "	Michael Pallak	American Psychological Association
11:49 "	Norman Garmezy	American Psychological Association Division of Clinical Psychology
12:01 p.m.		
12:13 "	Louis Rowitz	American Academy on Mental Retardation
12.25 "	Anita Bahn	American Public Health Association/ Association of Teachers of Preventive Medicine
12:37 "	M. Oskoui	University of Pittsburgh

The National Research Council is the principal operating agency of the National Academy of Sciences and the National Academy of Engineering to serve government and other organizations

12:49 p.m.	OPEN DISCUSSION	
1:15 "	LUNCH	

SESSION III

2:10 "	Jack Rakosky	Indiana University
2:22 "	Richard Ranney	American Association for Dental Research
2:34 "	Ralph Wallerstein	American Society of Hematology
2:46 "	Thomas Morgan	Association of American Medical Colleges
2:58 "	Barbara Hansen	American Nurses' Association
3:10 "	Mary Conway	University of Wisconsin, School of Nursing
3:22 "		
3:34 "	COFFEE	

SESSION IV

3:54 "	Roger Detels	Society for Epidemiological Research
4:06 "	Sam Gusman	The Conservation Foundation
4:18 "	Warren Muir	Environmental Protection Agency
4:30 "	Lowell Greenbaum	Federation of American Societies for Experimental Biology
4:42 "		
4:54 "	Robert Acker	American Society for Microbiology
5:06 "	Robert Plonsey	Case Western Reserve University
5:18 "	James Gallagher	Society for Research in Child Development
5:30 "	OPEN DISCUSSION	
6:00 "	ADJOURNMENT	

APPENDIX C4

INVITATIONAL CONFERENCE ON HEALTH SERVICES RESEARCH PERSONNEL, MAY 17, 1978, WASHINGTON, D.C.

MORNING SESSION

ESTIMATING THE MARKET FOR HEALTH SERVICES RESEARCH PERSONNEL

9:00 a.m.
OPENING REMARKS: Gerald T. Perkoff, *Chairman Panel on Health Services Research*

The Role for Investigators in National Health Planning: Harry Cain/Helen Thornberry, *Bureau of Health Planning, HRA*

Training for the Delivery of Health Care: The V.A. Experience: Carleton Evans, *Veterans Administration*

The Role of Health Services Research Centers: Sam Shapiro, *The Johns Hopkins University*

Focus on Mental Health Services Research: William Goldman, *San Francisco Community Mental Health Services*

10:30 a.m.
DISCUSSION

11:00 a.m.
Investigators for Third Party Payors: David H. Klein, *Blue Cross/Blue Shield Associations*

Developments in Independent Research Corporations: John E. Ware, Jr., *The RAND Corporation*

11:45 a.m.
DISCUSSION

12:15 p.m.
Luncheon

AFTERNOON SESSION

THE ACADEMIC PERSPECTIVE

1:15 p.m.
OPENING REMARKS: Gerald T. Perkoff

John C. Beck, *Director, Clinical Scholars Program, Robert Wood Johnson Foundation*

Robert Eichhorn, *Director, Health Services Research and Training Program, Purdue University*

Barbara Starfield, *Head, Division of Health Care Organizations, The Johns Hopkins University*

Paul Wortman, *Co-Director, Division of Methodology and Evaluation Research, Northwestern University*

Carolyn Williams, *School of Public Health/School of Nursing, University of North Carolina, Chapel Hill*

3:15 p.m.
DISCUSSION

4:15 p.m.
SUMMING UP: Gerald T. Perkoff

4:30 p.m.
Adjournment

* * *

Committee on a Study of National Needs for Biomedical and Behavioral Research Personnel

Staff Director: Herbert B. Pahl

Panel on Health Services Research

Gerald T. Perkoff, *Chairman*
Washington University School of Medicine
Isidore Altman
University of Pittsburgh
Jack Elinson
Columbia University
Charles D. Flagle
The Johns Hopkins University
Robert J. Haggerty
Harvard School of Public Health
Maureen Henderson
University of Washington
Irving J. Lewis
Albert Einstein College of Medicine
Jerry Miner
Syracuse University
David Salkever
The Johns Hopkins University
Rozella M. Schlotfeldt
Case Western Reserve University

Committee Liaison: David Mechanic
University of Wisconsin
Executive Secretary: Pamela Ebert-Flattau

APPENDIX C5

NATIONAL RESEARCH COUNCIL
COMMISSION ON HUMAN RESOURCES

[illegible] Constitution Avenue Washington, D.C. [illegible]

COMMITTEE ON A STUDY OF NATIONAL NEEDS FOR
BIOMEDICAL AND BEHAVIORAL RESEARCH PERSONNEL

**Meeting of the Psychiatry Conference
Steering Committee**

January 20, 1978

**Room 713
Joseph Henry Bldg.**

Agenda

9:00 a.m.	**Opening Remarks: Dr. Lipton**
9:15	**Status Report:** (a) Conference Arrangements: Dr. Ebert-Flattau (b) Data Collection Activities: Dr. Ebert-Flattau Mr. Allen Singer
10:00	**Discussion:** (a) Issues in Psychiatry Research Training (i) Scientific/Professional (ii) Governmental (b) Scope of One-Day Invitational Conference (c) Scope of Issue Treatment within NRSA Framework
11:00	**Invited Speakers:** Dr. David Hamburg, IOM Mr. David Kefauver, ADAMHA Dr. William Batchelor, NIH
NOON	**Adjournment for Lunch**
	Executive Session
1:00	**Recommendations to NRSA Committee**
4:00	**Other Business**
4:30	**Adjournment**

The National Research Council is the principal operating agency of the National Academy of Sciences and the National Academy of Engineering to serve government and other organizations

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NATIONAL RESEARCH COUNCIL
COMMISSION ON HUMAN RESOURCES

[illegible] Constitution Avenue Washington, D.C. [illegible]

COMMITTEE ON A STUDY OF NATIONAL NEEDS FOR
BIOMEDICAL AND BEHAVIORAL RESEARCH PERSONNEL

**Meeting of the Psychiatry Conference
Steering Committee**

**January 20, 1978
Washington, D.C.**

Attendance

Panel

- Morris Lipton (Chairman), University of North Carolina
- Jerry Miner, Syracuse University
- Lee Robins, Washington University, St. Louis

Invited Participants

- Thomas Detre, University of Pittsburgh
- Samual Guze, Washington University, St. Louis
- Victor Pfeiffer, President's Commission on Mental Health
- David Kefauver, Alcohol, Drug Abuse, and Mental Health Administration

Institute of Medicine

- David Hamburg

NRSA Staff

- Herbert Pahl
- Pam Ebert-Flattau
- Allen Singer

The National Research Council is the principal operating agency of the National Academy of Sciences and the National Academy of Engineering to serve government and other organizations

APPENDIX D

COMMITTEE'S RESTATED RECOMMENDATIONS AND RECLASSIFICATION OF FIELDS

APP. D1 The Committee's 1976 Recommendations Restated in the Format of the 1978 Recommendations

				Biomedical Sciences				
			Total	Basic[a]	Medical Scientist Program	Behavioral Sciences	Clinical Sciences[a]	Health Services Research
1976	Total	Total	13,901	8,600	581	1,860	2,675	185
		Pre	7,616	5,400	581	1,500	0	135
		Post	6,285	3,200	0	360	2,675	50
	Trainees	Total	10,806	6,520	581	1,505	2,050	150
		Pre	7,286	5,240	581	1,350	0	115
		Post	3,520	1,280	0	155	2,050	35
	Fellows	Total	3,095	2,080	0	355	625	35
		Pre	330	160	0	150	0	20
		Post	2,765	1,920	0	205	625	15
1977	Total	Total	13,925	8,600	600	1,740	2,800	185
		Pre	7,335	5,400	600	1,200	0	135
		Post	6,590	3,200	0	540	2,800	50
	Trainees	Total	10,780	6,520	600	1,410	2,100	150
		Pre	7,035	5,240	600	1,080	0	115
		Post	3,745	1,280	0	330	2,100	35
	Fellows	Total	3,145	2,080	0	330	700	35
		Pre	300	160	0	120	0	20
		Post	2,845	1,920	0	210	700	15
1978	Total	Total	13,775	8,600	600	1,590	2,800	185
		Pre	6,985	5,400	600	850	0	135
		Post	6,790	3,200	0	740	2,800	50
	Trainees	Total	10,670	6,520	600	1,300	2,100	150
		Pre	6,705	5,240	600	750	0	115
		Post	3,965	1,280	0	550	2,100	35
	Fellows	Total	3,105	2,080	0	290	700	35
		Pre	280	160	0	100	0	20
		Post	2,825	1,920	0	190	700	15

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[a] In previous reports, the Committee's recommendations for the Medical Scientist Training Program were included under the clinical sciences area.

[b] Recommendations for biostatistics, epidemiology, community and environmental health, and other training fields, not specifically shown in this table are included here.

APP. D2 The Committee's 1977 Recommendations Restated in the Format of the 1978 Recommendations

				Biomedical Sciences					
			Total	Basic[c]	Medical Scientist Program	Behavioral Sciences	Clinical Sciences[a]	Health Services Research[b]	Nursing Research
1979	Total	Total	13,215	7,450	700	1,490	2,800	550	225
		Pre	6,212	4,250	700	745	0	325	193
		Post	7,003	3,200	0	745	2,800	225	32
	Trainees	Total	8,877	4,250	700	1,222	2,240	415	50
		Pre	5,874	4,250	700	611	0	270	43
		Post	3,003	0	0	611	2,240	145	7
	Fellows	Total	4,338	3,200	0	268	560	135	175
		Pre	338	0	0	134	0	55	150
		Post	4,000	3,200	0	134	560	80	25
1980	Total	Total	13,295	7,450	700	1,390	2,800	715	240
		Pre	6,130	4,250	700	575	0	415	190
		Post	7,165	3,200	0	815	2,800	300	50
	Trainees	Total	8,935	4,250	700	1,140	2,240	540	65
		Pre	5,822	4,250	700	472	0	350	50
		Post	3,113	0	0	668	2,240	190	15
	Fellows	Total	4,360	3,200	0	250	560	175	175
		Pre	308	0	0	103	0	65	140
		Post	4,052	3,200	0	147	560	110	35
1981	Total	Total	13,260	7,450	700	1,300	2,800	740	270
		Pre	5,975	4,250	700	390	0	430	205
		Post	7,285	3,200	0	910	2,800	310	65
	Trainees	Total	8,906	4,250	700	1,066	2,240	555	95
		Pre	5,700	4,250	700	320	0	360	70
		Post	3,206	0	0	746	2,240	195	25
	Fellows	Total	4,354	3,200	0	234	560	185	175
		Pre	275	0	0	70	0	70	135
		Post	4.079	3,200	0	164	560	115	40

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[a] In previous reports, the Committee's recommendations for the Medical Scientist Training Program were included under the clinical sciences area.

[b] Reflects the recommended restoration in FY 1979 of the training program of the NCHSR.

[c] Recommendations for biostatistics, epidemiology, community and environmental health, and other training fields specifically shown in this table are included here.

APP. D3 NIH[a] and ADAMHA Classifications of Training Fields

NIH	ADAMHA
Biomedical sciences General medical and biological sciences * Anatomy * Biochemistry * Biophysics * Microbiology * Pathology * Pharmacology * Physiology Multidisciplinary[b] Radiation, nonclinical Entomology * Genetics * Nutrition Hydrobiology Ecology * Cell biology * Zoology Botany * Biology NEC * General med. and bio. sci. * Environmental sciences Mathematics; physical sciences, engineering, other Mathematics Chemistry Physics Earth and related sciences Agricultural fields * Engineering health-related Other health-related fields * Biostatistics * Epidemiology Community and environmental health Accident prevention Disease prevention and control Maternal and child health Dental public health Mental health Hospital and medical care Other community health Radiological health Water pollution control Air pollution Environmental engineering Food protection Occupational health Health administration Social work Pharmacy Other health-related professions	**Biomedical sciences** Behavioral genetics Biological anthropology Neurobehavioral sciences Psychoneuropharmacology Ethology Other
Behavioral sciences Psychology General and experimental Comparative and animal Physiological Developmental Personality Social-psychological aspects Abnormal Clinical Educational, counseling, and guidance Other Behavioral sciences except psychology Sociology Social psychology-sociological aspects Anthropology Social sci. and related disciplines Other fields	**Behavioral sciences** Psychology Child/developmental Social/ecological Cognition Perception/sensory Physiological Clinical/developmental Other Social sciences Cultural anthropology Sociology Epidemiology Other
Clinical sciences Internal medicine Allergy Pediatrics Geriatrics Obstetrics-gynecology Radiology Surgery Otorhinolaryngology Ophthalmology Anesthesiology Neuropsychiatry Neurology Psychiatry Preventive medicine Other clinical medicine Veterinary medicine Dentistry	**Clinical sciences** (ADAMHA provides support to clinical investigators, but does not consider any of this to be the area of clinical sciences).
Health services research (See chapter 5 for a list of disciplines contributing to this area).	**Health services research** Mental health services research Alcoholism services research Drug abuse services research
Nursing research	**Nursing research**

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[*] These fields correspond to those defined by the Committee as the Basic Biomedical Sciences. See NRC (1977a, p. 29).

[a] Since 1962, the NIH has used a classification scheme called the Discipline, Specialty Field Code (DSF) to classify its trainees and fellows. The major categories of that scheme are shown in this table. They have been grouped into 5 broad areas of biomedical and behavioral research that the Committee has established for purposes of this study.

[b] Most of the trainees in the Medical Scientist Training Program are classified in this category.

APP. D4 NIH Traineeship and Fellowship Awards for FY 1977, by Detailed Field of Training

	Total			Trainees			Fellows		
	Total	Pre	Post	Total	Pre	Post	Total	Pre	Post
TOTAL ALL FIELDS	10,370	5,297	5,073	8,587	5,289	3,298	1,783	8	1,775
Biomedical sciences	7,023	4,343	2,680	5,599	4,335	1,264	1,425	8	1,417
Basic	6,629	4,111	2,518	5,222	4,103	1,119	1,407	8	1,399
Anatomy	95	47	48	60	46	14	35	1	34
Biochemistry	419	225	194	233	225	8	186		186
Biophysics	143	84	59	92	84	8	51		51
Microbiology	418	137	281	180	135	45	238	2	236
Pathology	492	191	301	426	191	235	66		66
Pharmacology	677	483	194	591	483	108	86		86
Physiology	391	120	271	172	117	55	219	3	216
Multidisciplinary[a]	873	673	200	873	673	200			
Radiation, non-clinical	31	18	13	25	17	8	6	1	5
Genetics	834	624	210	738	624	114	96		96
Nutrition	48	30	18	41	30	11	7		7
Cell biology	1,002	778	224	815	778	37	187		187
Zoology	2		2				2		2
Other gen. med. and biosci.	682	331	351	545	330	215	137	1	136
Environmental sciences	159	110	49	156	110	46	3		3
Mathematics[b]	10	5	5	7	5	2	3		3
Chemistry	116	41	75	49	41	8	67		67
Physics	17	7	10	7	7		10		10
Engineering	220	207	13	212	207	5	8		8
Community and environmental health[b]	185	105	80	176	105	71	9		9
Social work	3	3		3	3				
Pharmacy	1		1				1		1
Other health-related prof.	2		2				2		2
Disease prevention and control	15	4	11	14	4	10	1		1
Mental health	45	33	12	45	33	12			
Water pollution control	1		1				1		1
Air pollution	2		2				2		2
Food protection	2		2				2		2
Occupational health	85	55	30	85	55	30			
Multicategorical	29	10	19	29	10	19			
Epidemiology and Biostatistics[b]	210	127	83	201	127	74	9		9
Behavioral sciences	455	367	88	386	367	19	69		69
General/experimental psychology	94	82	12	83	82	1	11		11
Comparative/animal psychology	1		1				1		1
Physiological psychology	50	26	24	26	26		24		24
Developmental psychology	32	19	13	20	19	1	12		12
Personality psychology	6	5	1	6	5	1			
Abnormal psychology	7	6	1	6	6		1		1
Clinical psychology	48	34	14	39	34	5	9		9
Sociology	115	106	9	114	106	8	1		1
Anthropology	30	28	2	29	28	1	1		1
Social science and related disciplines	11	11		11	11				
Other fields	61	50	11	52	50	2	9		9
Clinical sciences	2,891	587	2,304	2,60	587	2,015	289		289
Internal medicine	1,851	430	1,421	1,702	430	1,272	149		149
Allergy	15		15	15		15			
Pediatrics	98	5	93	78	5	73	20		20
Geriatrics	9		9	9		9			
Obstetrics/gynecology	26		26	25		25	1		1
Radiology	118	35	83	113	35	78	5		5
Surgery	120	8	112	111	8	103	9		9
Otorhinolaryngology	41	10	31	32	10	22	9		9
Ophthalmology	203	36	167	160	36	124	43		43
Anesthesiology	12		12	11		11	1		1
Neurology	67	12	55	51	12	39	16		16
Psychiatry	7	6	1	7	6	1			
Other clinical medicine	106	21	85	97	21	76	9		9
Clinical dentistry	182	24	158	159	24	135	23		23
Veterinary medicine	36		36	32		32	4		4

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[a] Most of the trainees in the Medical Scientist Training Program are classified in this category. In FY 1977, there were 497 trainees in the MST program.

[b] These fields were reported by NIH in the health services research category. The Committee believes they are more properly classified as shown in this table.

APPENDIX D5

B.1.

ADAMHA RESEARCH TRAINING SUPPORT

BY RESEARCH AREAS AND CLUSTER DISCIPLINES - FY 1977

RESEARCH AREAS AND CLUSTER DISCIPLINES	TRAINING GRANTS				FELLOWSHIPS			
	NO. OF GRANTS	TOTAL AMOUNT	NO. OF PREDOC STIPENDS 1/	NO. OF POSTDOC STIPENDS 1/	NO. OF AWARDS	TOTAL AMOUNT	NO. OF PREDOC AWARDS	NO. OF POSTDOC AWARDS
I. DEVELOPMENT OF BEHAVIOR								
A. BIOLOGICAL SCIENCES	34	$2,491,435	130	84	98	$1,019,291	44	54
B. PSYCHOLOGICAL SCIENCES	57	2,613,633	347	42	111	1,195,294	48	63
C. SOCIAL SCIENCES	19	1,388,838	88	30	52	481,053	39	13
D. OTHER	2	214,669	0	12	2	28,600	0	2
TOTAL RESEARCH AREA I.	112	6,708,575	565	168	263	2,724,238	131	132
II. DISORDERS & MALADAPTIVE BEHAVIOR								
A. BIOLOGICAL SCIENCES	16	1,065,550	18	57	7	76,900	3	4
B. PSYCHOLOGICAL SCIENCES	13	857,725	36	27	19	203,600	8	11
C. SOCIAL SCIENCES	14	1,119,469	44	34	5	55,600	2	3
D. OTHER	0	0	0	0	1	16,600	0	1
TOTAL RESEARCH AREA II.	43	3,042,744	98	118	32	352,700	13	19
III. SOCIAL ISSUES RELATING TO AA, DA & MH								
A. BIOLOGICAL SCIENCES	0	0	0	0	0	0	0	0
B. PSYCHOLOGICAL SCIENCES	22	997,994	159	5	5	59,300	2	3
C. SOCIAL SCIENCES	20	1,931,550	153	30	15	135,350	10	5
D. OTHER	2	346,324	35	0	2	18,255	2	0
TOTAL RESEARCH AREA III.	44	3,275,868	347	35	22	212,905	14	8
IV. SERVICES RESEARCH								
A. BIOLOGICAL SCIENCES	0	0	0	0	0	0	0	0
B. PSYCHOLOGICAL SCIENCES	5	165,880	21	2	0	0	0	0
C. SOCIAL SCIENCES	15	1,233,844	43	46	0	0	0	0
D. OTHER	4	470,572	15	17	1	14,084	0	1
TOTAL RESEARCH AREA IV.	24	1,870,296	79	65	1	14,084	0	1
TOTAL, ALL AREAS	223	$14,897,483	1,089	386	318	$3,303,927	158	160

EP/ADAMHA 2/78

1/ Represents number of stipends included on notices of grant award.

SOURCE: Office of the Assistant Administrator for Extramural Program, ADAMHA, February 1978.

B.2.

ADAMHA RESEARCH TRAINING SUPPORT BY CLUSTER DISCIPLINES - FY 1977

CLUSTER DISCIPLINES	TRAINING GRANTS				FELLOWSHIPS			
	No. of Grants	Total Amount	No. of Predoc Stipends[1]	No. of Postdoc Stipends[1]	No. of Awards	Total Amount	No. of Predoc Awards	No. of Postdoc Awards
A. BIOLOGICAL SCIENCES	50	$3,556,985	148	141	105	$1,096,191	47	58
B. PSYCHOLOGICAL SCIENCES	97	4,635,232	563	76	135	1,456,194	58	77
C. SOCIAL SCIENCES	68	5,673,701	328	140	72	672,003	51	21
D. OTHER	8	1,031,565	50	29	6	77,539	2	4
TOTAL, ALL CLUSTER DISCIPLINES	223	$14,897,483	1,089	386	318	$3,303,927	158	160

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[1] Represents number of stipends included on notices of grant award.

NIAAA RESEARCH TRAINING SUPPORT

BY RESEARCH AREAS AND CLUSTER DISCIPLINES - FY 1977

RESEARCH AREAS AND CLUSTER DISCIPLINES	TRAINING GRANTS				FELLOWSHIPS			
	NO. OF GRANTS	TOTAL AMOUNT	NO. OF PREDOC STIPENDS1/	NO. OF POSTDOC STIPENDS1/	NO. OF AWARDS	TOTAL AMOUNT	NO. OF PREDOC AWARDS	NO. OF POSTDOC AWARDS
I. DEVELOPMENT OF BEHAVIOR								
A. BIOLOGICAL SCIENCES	0	$ 0	0	0	4	$38,700	1	3
B. PSYCHOLOGICAL SCIENCES	0	0	0	0	3	22,775	2	1
C. SOCIAL SCIENCES	0	0	0	0	0	0	0	0
D. OTHER	1	72,109	0	4	0	0	0	0
TOTAL RESEARCH AREA I.	1	72,109	0	4	7	61,475	3	4
II. DISORDERS & MALADAPTIVE BEHAVIOR								
A. BIOLOGICAL SCIENCES	1	50,693	3	0	1	6,900	1	0
B. PSYCHOLOGICAL SCIENCES	4	259,521	14	3	1	13,400	0	1
C. SOCIAL SCIENCES	5	288,851	16	6	1	6,900	1	0
D. OTHER	0	0	0	0	0	0	0	0
TOTAL RESEARCH AREA II.	10	599,065	33	9	3	27,200	2	1
III. SOCIAL ISSUES RELATING TO AA, DA & MH								
A. BIOLOGICAL SCIENCES	0	0	0	0	0	0	0	0
B. PSYCHOLOGICAL SCIENCES	0	0	0	0	0	0	0	0
C. SOCIAL SCIENCES	0	0	0	0	0	0	0	0
D. OTHER	0	0	0	0	0	0	0	0
TOTAL RESEARCH AREA III.	0	0	0	0	0	0	0	0
IV. SERVICES RESEARCH								
A. BIOLOGICAL SCIENCES	0	0	0	0	0	0	0	0
B. PSYCHOLOGICAL SCIENCES	0	0	0	0	0	0	0	0
C. SOCIAL SCIENCES	0	0	0	0	0	0	0	0
D. OTHER	0	0	0	0	0	0	0	0
TOTAL RESEARCH AREA IV.	0	0	0	0	0	0	0	0
TOTAL, ALL AREAS	11	$671,174	33	13	10	$88,675	5	5

EP/ADAMHA 2/78

1/ Represents number of stipends included on notices of grant award.

NIAAA RESEARCH TRAINING SUPPORT
BY CLUSTER DISCIPLINES - FY 1977

	TRAINING GRANTS				FELLOWSHIPS			
CLUSTER DISCIPLINES	No. of Grants	Total Amount	No. of Predoc Stipends[1]	No. of Postdoc Stipends[1]	No. of Awards	Total Amount	No. of Predoc Awards	No. of Postdoc Awards
A. BIOLOGICAL SCIENCES	1	$ 50,693	3	0	5	$ 45,600	2	3
B. PSYCHOLOGICAL SCIENCES	4	259,521	14	3	4	36,175	2	2
C. SOCIAL SCIENCES	5	288,851	16	6	1	6,900	1	0
D. OTHER	1	72,109	0	4	0	0	0	0
TOTAL, ALL CLUSTER DISCIPLINES	11	$671,174	33	13	10	$ 88,675	5	5

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[1] Represents number of stipends included on notices of grant award.

EP/ADAMHA 2/78

NIDA RESEARCH TRAINING SUPPORT

BY RESEARCH AREAS AND CLUSTER DISCIPLINES - FY 1977

RESEARCH AREAS AND CLUSTER DISCIPLINES	TRAINING GRANTS				FELLOWSHIPS			
	NO. OF GRANTS	TOTAL AMOUNT	NO. OF PREDOC STIPENDS1/	NO. OF POSTDOC STIPENDS1/	NO. OF AWARDS	TOTAL AMOUNT	NO. OF PREDOC AWARDS	NO. OF POSTDOC AWARDS
I. DEVELOPMENT OF BEHAVIOR								
A. BIOLOGICAL SCIENCES	0	$ 0	0	0	0	$ 0	0	0
B. PSYCHOLOGICAL SCIENCES	0	0	0	0	21	222,800	10	11
C. SOCIAL SCIENCES	0	0	0	0	1	19,600	0	1
D. OTHER	0	0	0	0	3	26,800	2	1
TOTAL RESEARCH AREA I.	0	0	0	0	25	269,200	12	13
II. DISORDERS & MALADAPTIVE BEHAVIOR								
A. BIOLOGICAL SCIENCES	3	139,686	7	6	3	23,800	2	1
B. PSYCHOLOGICAL SCIENCES	1	72,818	5	0	0	0	0	0
C. SOCIAL SCIENCES	0	0	0	0	0	0	0	0
D. OTHER	0	0	0	0	0	0	0	0
TOTAL RESEARCH AREA II.	4	212,504	12	6	3	23,800	2	1
III. SOCIAL ISSUES RELATING TO AA, DA & MH								
A. BIOLOGICAL SCIENCES	0	0	0	0	0	0	0	0
B. PSYCHOLOGICAL SCIENCES	0	0	0	0	0	0	0	0
C. SOCIAL SCIENCES	0	0	0	0	0	0	0	0
D. OTHER	0	0	0	0	0	0	0	0
TOTAL RESEARCH AREA III.	0	0	0	0	0	0	0	0
IV. SERVICES RESEARCH								
A. BIOLOGICAL SCIENCES	0	0	0	0	0	0	0	0
B. PSYCHOLOGICAL SCIENCES	0	0	0	0	0	0	0	0
C. SOCIAL SCIENCES	0	0	0	0	0	0	0	0
D. OTHER	0	0	0	0	0	0	0	0
TOTAL RESEARCH AREA IV.	0	0	0	0	0	0	0	0
TOTAL, ALL AREAS	4	$212,504	12	6	28	$293,000	14	14

1/ Represents number of stipends included on notices of grant award.

B.6.

NIDA RESEARCH TRAINING SUPPORT BY CLUSTER DISCIPLINES - FY 1977

CLUSTER DISCIPLINES	TRAINING GRANTS				FELLOWSHIPS			
	No. of Grants	Total Amount	No. of Predoc Stipends[1]	No. of Postdoc Stipends[1]	No. of Awards	Total Amount	No. of Predoc Awards	No. of Postdoc Awards
A. BIOLOGICAL SCIENCES	3	$ 139,686	7	6	24	$ 246,600	12	12
B. PSYCHOLOGICAL SCIENCES	1	72,818	5	0	1	19,600	0	1
C. SOCIAL SCIENCES	0	0	0	0	3	26,800	2	1
D. OTHER	0	0	0	0	0	0	0	0
TOTAL, ALL CLUSTER DISCIPLINES	4	$ 212,504	12	6	28	$ 293,000	14	14

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[1] Represents number of stipends included on notices of grant award.

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NIMH RESEARCH TRAINING SUPPORT

B.7.

BY RESEARCH AREAS AND CLUSTER DISCIPLINES - FY 1977

RESEARCH AREAS AND CLUSTER DISCIPLINES	TRAINING GRANTS				FELLOWSHIPS			
	NO. OF GRANTS	TOTAL AMOUNT	NO. OF PREDOC STIPENDS 1/	NO. OF POSTDOC STIPENDS 1/	NO. OF AWARDS	TOTAL AMOUNT	NO. OF PREDOC AWARDS	NO. OF POSTDOC AWARDS
I. DEVELOPMENT OF BEHAVIOR								
A. BIOLOGICAL SCIENCES	34	$2,491,435	130	84	73	$ 757,791	33	40
B. PSYCHOLOGICAL SCIENCES	57	2,613,633	347	42	107	1,152,919	46	61
C. SOCIAL SCIENCES	19	1,388,838	88	30	49	454,253	37	12
D. OTHER	1	142,560	0	8	2	28,600	0	2
TOTAL RESEARCH AREA I.	111	6,636,466	565	164	231	2,393,563	116	115
II. DISORDERS & MALADAPTIVE BEHAVIOR								
A. BIOLOGICAL SCIENCES	12	875,171	8	51	3	46,200	0	3
B. PSYCHOLOGICAL SCIENCES	8	525,386	17	24	18	190,200	8	10
C. SOCIAL SCIENCES	9	830,618	28	28	4	48,700	1	3
D. OTHER	0	0	0	0	1	16,600	0	1
TOTAL RESEARCH AREA II.	29	2,231,175	53	103	26	301,700	9	17
III. SOCIAL ISSUES RELATING TO AA, DA & MH								
A. BIOLOGICAL SCIENCES	0	0	0	0	0	0	0	0
B. PSYCHOLOGICAL SCIENCES	22	997,994	159	5	5	59,300	2	3
C. SOCIAL SCIENCES	20	1,931,550	153	30	15	135,350	10	5
D. OTHER	2	346,324	35	0	2	18,255	2	0
TOTAL RESEARCH AREA III.	44	3,275,868	347	35	22	212,905	14	8
IV. SERVICES RESEARCH								
A. BIOLOGICAL SCIENCES	0	0	0	0	0	0	0	0
B. PSYCHOLOGICAL SCIENCES	5	165,880	21	2	0	0	0	0
C. SOCIAL SCIENCES	15	1,233,844	43	46	0	0	0	0
D. OTHER	4	470,572	15	17	1	14,084	0	1
TOTAL RESEARCH AREA IV.	24	1,870,296	79	65	1	14,084	0	1
TOTAL, ALL AREAS	208	$14,013,805	1,044	367	280	$2,922,252	139	141

1/ Represents number of stipends included on notices of grant award.

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B.8.

NIMH RESEARCH TRAINING SUPPORT BY CLUSTER DISCIPLINES - FY 1977

	TRAINING GRANTS				FELLOWSHIPS			
CLUSTER DISCIPLINES	No. of Grants	Total Amount	No. of Predoc Stipends[1]	No. of Postdoc Stipends[1]	No. of Awards	Total Amount	No. of Predoc Awards	No. of Postdoc Awards
A. BIOLOGICAL SCIENCES	46	$ 3,366,606	138	135	76	$ 803,991	33	43
B. PSYCHOLOGICAL SCIENCES	92	4,302,893	544	73	130	1,402,419	56	74
C. SOCIAL SCIENCES	63	5,384,850	312	134	68	638,303	48	20
D. OTHER	7	959,456	50	25	6	77,539	2	4
TOTAL, ALL CLUSTER DISCIPLINES	208	$14,013,805	1,044	367	280	$2,922,252	139	141

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[1] Represents number of stipends included on notices of grant award.

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APPENDIX E

SURVEY OF BIOMEDICAL AND BEHAVIORAL SCIENCE DEPARTMENTS

Notes on Tables

For reference, the survey question used in each table is noted in parentheses in the table title, e.g., "(A2)." The questionnaire may be found in Appendix E46.

Statistics in these tables (except as noted) are calculated on a weighted basis that reflects an estimate of how the survey population as a whole would answer each question. The weight is based on the overall survey response stratified according to known factors in the survey population (as provided by the NSF Graduate Science Student Support Survey). The factors used in stratifying the department population are 1) fine field, 2) public-private control of the institution, and 3) presence of students who have HEW fellowship/traineeship support. The response information provided in each table is the estimate of the survey population (SURVEY WN) and the actual number of departments responding to the question (RESPONSE N). The statistics presented are based on the weighted response, which is not shown on the tables...

Tables E5-E7, E19, E20, E27-E29, E40, and E41 use unweighted data due to the fact that only departments reporting matches between two different data points can be included to obtain accurate trends. This means, however, that the total number of individuals shown understates the actual population. Mean data, growth trends, and percent distribution are more reliable and should therefore be given more attention.

Many of the tables have column dimensions that break down responses according to departmental characteristics. These are defined as follows:

Roose-Andersen Rating - based on a 1969 ACE reputational survey:

$\geq$3.5 -- departments with a 3.5 to 5.0 (top) rating, roughly the top 15 in each field.

Other -- departments receiving less that a 3.5 rating and departments not included in the rating survey.

Institution Control - whether the department is located in a public or private institution.

School Type - whether the department is located in a medical school or a graduate school (including all nonmedical school departments, e.g., agriculture, engineering, and public health). This dimension is not used for Behavioral Sciences because very few departments in this area are located in medical schools.

Possession of Training Grant - whether or not the department had a training grant between 1972 and 1976.

Department Age - the age of a department depending upon the year it awarded its first Ph.D.: Old (before 1950); Middle (1951-1965); and Young (1966 to present).

APP. E2 NRSAA Survey of Biomedical and Behavioral Science Departments--Response by Fine Field, Broad Field

NRSAA Survey Field	Survey Depts. N	Percent Departments Responding to Survey												Percent Not Responding
			Roose-Andersen Rating		Institution Control		School Type		Possession of Training Grant		Department Age			
		Total	≥3.5	Other	Public	Private	Graduate	Medical	Yes	No	Old	Middle	New	
TOTAL ALL FIELDS	1,806	76.6	9.0	67.7	52.2	24.4	46.9	29.7	33.1	43.6	16.7	19.8	21.9	23.4
Total biomedical	1,324	77.0	9.2	67.7	52.6	24.3	37.3	39.7	33.9	43.1	16.5	20.4	20.5	23.0
Biomed engineering	28	78.6	3.6	75.0	46.4	32.1	64.3	14.3	42.9	35.7		7.1	50.0	21.4
Anatomy	97	85.6	4.1	81.4	52.6	33.0	6.2	79.4	27.8	57.7	24.7	25.8	13.4	14.4
Biochemistry	144	82.6	11.1	71.5	56.3	26.4	26.4	56.3	34.7	47.9	22.9	26.4	14.6	17.4
Biophysics	38	73.7	7.9	65.8	52.6	21.1	34.2	39.5	44.7	28.9	5.3	28.9	23.7	26.3
Microbiology	152	83.6	8.6	75.0	57.2	26.3	30.3	53.3	48.0	35.5	19.7	22.4	16.4	16.4
Pathology	88	62.5	4.5	58.0	36.4	26.1	6.8	55.7	30.7	31.8	6.8	10.2	22.7	37.5
Pharmacology	125	80.8	12.0	68.8	58.4	22.4	18.4	62.4	42.4	38.4	18.4	24.0	21.6	19.2
Physiology	130	81.5	7.7	73.8	55.4	26.2	16.9	64.6	35.4	46.2	17.7	23.8	17.7	18.5
Biology	98	87.8	10.2	77.6	45.9	41.8	83.7	4.1	26.5	61.2	18.4	15.3	30.6	12.2
Biometry/biostat.	21	81.0	14.3	66.7	57.1	23.8	33.3	47.6	42.9	38.1	9.5	14.3	33.3	19.0
Cell biology	24	83.3	25.0	58.3	45.8	37.5	45.8	37.5	54.2	29.2		33.3	41.7	16.7
Genetics	42	81.0	16.7	64.3	59.5	21.4	47.6	33.3	45.2	35.7	11.9	26.2	19.0	19.0
Nutrition	54	81.5	16.7	64.8	66.7	14.8	81.5		29.6	51.9	14.8	22.2	29.6	18.5
Zoology	59	81.4	10.2	71.2	78.0	3.4	79.7	1.7	22.0	59.3	35.6	23.7	10.2	18.6
Basic bioscience, NEC	53	79.2	1.9	77.4	43.4	35.8	67.9	11.3	26.4	52.8	9.4	11.3	35.8	20.8
Neurosciences	16	25.0	12.5	12.5	12.5	12.5	6.3	18.8	18.8	6.3			12.5	75.0
Pharmaceutical science	46	82.6	13.0	69.6	69.6	13.0	71.7	10.9	26.1	56.5	17.4	19.6	21.7	17.4
Veterinary science	65	40.0	3.1	36.9	36.9	3.1	40.0		9.2	30.8	6.2	7.7	13.8	60.0
Health serv. res.	44	43.2	9.1	34.1	27.3	15.9	34.1	9.1	29.5	13.6	13.6	15.9	6.8	56.8
Public health/ preventive medicine	21	47.6	9.5	38.1	28.6	19.0	33.3	14.3	38.1	9.5	19.0	14.3	4.8	52.4
Epidemiology	6	50.0	16.7	33.3	33.3	16.7	50.0		33.3	16.7	16.7	33.3		50.0
Health services	17	35.3	5.9	29.4	23.5	11.8	29.4	5.9	17.6	17.6	5.9	11.8	11.8	64.7
Total behavioral	474	75.9	8.4	67.5	50.8	25.1	73.8	2.1	30.8	45.1	17.7	18.4	25.3	24.1
Psychology	211	78.7	7.1	71.6	52.1	26.5	76.3	2.4	36.0	42.7	20.9	19.9	23.2	21.3
Communication science	29	58.6	6.9	51.7	51.7	6.9	48.3	10.3	27.6	31.0	13.8	24.1	10.3	41.4
Anthropology	69	85.5	14.5	71.0	59.4	26.1	85.5		24.6	60.9	13.0	23.2	35.2	14.5
Sociology	123	71.5	8.1	63.4	48.0	23.6	70.7	0.8	22.8	48.8	18.7	13.8	24.4	28.5
Sociology/anthro.	13	69.2		69.2	38.5	30.8	69.2		23.1	46.2	15.4	7.7	23.1	30.8
Behavioral science, NEC	29	72.4	10.3	62.1	37.9	34.5	69.0	3.4	48.3	24.1	6.9	13.8	34.5	27.6
NURSING	8	62.5		62.5	62.5		37.5	25.0	25.0	37.5			37.5	37.5

APP. E3 Primary Reason for 1974-76 Predoctoral Enrollment Change--Basic Biomedical Sciences--Percent Distribution (A2, A4)

Primary Reason for Predoctoral Change	Total	Roose-Andersen Rating		Institution Control		Institution Type		Possession of Training Grant		Department Age		
		≥3.5	Other	Public	Private	Graduate	Medical	Yes	No	Old	Middle	Young
INCREASE (#)	438	44	394	331	107	217	221	169	269	88	120	138
TOTAL	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Federal fellowships/ traineeships	12.0	25.4	10.5	9.5	19.7	9.2	15.0	26.6	3.3	17.9	10.1	11.7
Federal research grants	11.1	10.2	11.2	12.7	6.3	13.9	8.2	12.1	10.5	17.9	11.5	8.0
Institution/state	14.1	1.7	15.5	14.3	13.4	14.9	13.2	8.4	17.5	11.6	11.5	16.0
Number of applicants	22.3	8.5	23.8	19.7	27.5	27.5	16.8	12.6	28.0	17.0	18.2	22.9
Quality of applicants	14.6	8.5	15.3	14.5	14.8	10.8	18.6	12.1	16.1	13.4	15.5	18.6
Demand for graduates	7.7	16.9	6.6	7.2	9.2	9.8	5.4	8.4	7.2	7.1	10.8	6.4
Professional school competition	3.0		3.3	3.5	1.4	2.0	3.9	1.9	3.6	0.9	5.4	4.3
Faculty size	5.7	11.9	5.0	5.3	7.0	3.4	8.2	5.6	5.8	8.0	4.1	4.8
Other	9.6	16.9	8.7	9.9	8.5	8.5	10.7	12.1	8.0	6.3	12.8	7.4
DECREASE (#)	299	32	267	185	114	156	143	132	167	76	86	61
TOTAL	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Federal fellowships/ traineeships	37.2	65.8	34.0	32.2	45.2	29.6	45.4	62.3	17.5	42.1	42.7	29.3
Federal research grants	13.2	2.6	14.4	12.4	14.4	12.2	14.2	8.4	17.0	20.0	12.7	2.4
Institution/state	10.6	2.6	11.4	12.4	7.5	15.3	5.5	5.4	14.6	7.4	10.0	12.2
Number of applicants	8.4	7.9	8.5	8.2	8.9	8.2	8.7	3.0	12.7	6.3	12.7	7.3
Quality of applicants	12.7	7.9	13.2	12.9	12.3	11.2	14.2	9.6	15.1	8.4	9.1	23.2
Demand for graduates	4.2	2.6	4.4	6.4	0.7	8.2		1.8	6.1	6.3	0.9	4.9
Professional school competition	2.4	5.3	2.1	1.3	4.1	1.0	3.8	3.0	1.9		2.7	2.4
Faculty size	4.7	2.6	5.0	6.0	2.7	6.1	3.3	3.6	5.7	4.2	4.5	4.9
Other	6.6	2.6	7.0	8.2	4.1	8.2	4.9	3.0	9.4	5.3	4.5	13.4
NO CHANGE (#)	90	11	79	60	30	26	64	32	58	13	19	33
SURVEY NN	1,324	150	1,166	896	428	648	676	527	797	274	338	367

APP. B4 Primary Reason for Change in Number of Postdoctorals, 1974-76--Basic Biomedical Sciences--Percent Distribution (A2, A4)

Primary Reason for Postdoctoral Change	Total	Roose-Anderson Rating		Institution Control		Institution Type		Possession of Training Grant		Department Age		
		>3.5	Other	Public	Private	Graduate	Medical	Yes	No	Old	Middle	Young
INCREASE (N)	301	40	261	202	99	129	172	158	143	83	69	74
TOTAL	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Federal fellowships/ traineeships	23.5	24.5	23.3	19.5	31.0	17.4	27.7	34.0	12.2	21.4	16.9	29.2
Federal research grants	46.1	30.2	48.8	51.2	36.4	56.8	38.6	36.6	56.4	49.5	49.4	40.6
Institution/state	3.7	1.9	4.0	4.9	1.6	6.5	1.8	1.5	6.1	1.9	4.8	5.2
Number of applicants	5.1	9.4	4.3	4.5	6.2	5.8	4.5	5.7	4.4	5.8	6.0	2.1
Quality of applicants	5.1	1.9	5.6	5.3	4.7	1.9	7.3	5.2	5.0	2.9	6.0	8.3
Demand for graduates	6.4	13.2	5.3	4.9	9.3	8.4	5.0	7.2	5.5	4.9	9.6	7.3
Professional school competition	0.3		0.3		0.8		0.5	0.5			1.0	
Faculty size	5.1	15.1	3.4	4.1	7.0	1.3	7.7	4.6	5.5	6.8	3.6	2.1
Other	4.8	3.8	5.0	5.7	3.1	1.9	6.8	4.6	5.0	5.8	3.6	5.2
DECREASE (N)	135	27	108	95	40	48	87	77	58	35	45	28
TOTAL	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Federal fellowships/ traineeships	35.5	46.9	32.8	28.3	54.3	41.0	32.4	42.4	27.0	41.0	33.9	38.2
Federal research grants	44.0	46.9	43.3	49.2	30.4	41.0	45.7	40.2	48.6	41.0	46.4	44.1
Institution/state	6.0		7.5	5.8	6.5	9.8	3.8	3.3	9.5		5.4	
Number of applicants	4.8		6.0	6.7			7.6	3.3	6.8	2.6	1.8	8.8
Quality of applicants	3.6		4.5	4.2	2.2	1.6	4.8	3.3	4.1	5.1	3.6	5.9
Demand for graduates												
Professional school competition												
Faculty size	3.0		3.7	2.5	4.3	3.3	2.9	4.3	1.4	5.1	3.6	2.9
Other	3.0	6.3	2.2	3.3	2.2	3.3	2.9	3.3	2.7	5.1	5.4	
NO CHANGE (N)	47	2	45	32	15	23	24	19	28	7	15	14
SURVEY NN	975	143	832	649	326	427	548	475	500	231	272	234

APP. E5 Estimated New Faculty Positions Available in 1981-82--Basic Biomedical Sciences[a] (A2, A6)

		Roose-Andersen Rating		Institution Control		Institution Type		Possession of Training Grant		Department Age		
Faculty Positions	Total	≥ 3.5	Other	Public	Private	Graduate	Medical	Yes	No	Old	Middle	Young
SURVEY N (Departments)	1,324	158	1,166	896	428	648	676	527	797	274	338	367
RESPONSE N (Departments)	828	87	741	592	236	406	422	333	495	177	230	228
1976 faculty												
Total	14,440	1,913	12,527	10,542	3,898	7,658	6,782	6,763	7,677	3,548	3,977	3,771
Mean	17.4	22.0	16.9	17.8	16.5	18.9	16.1	20.3	15.5	20.0	17.3	16.5
Estimated 1981 faculty												
Total	16,147	2,100	14,047	11,772	4,375	8,429	7,718	7,520	8,627	3,950	4,436	4,244
Mean	19.5	24.1	19.0	19.9	18.5	20.8	18.3	22.6	17.4	22.3	19.3	18.6
1976-81 net change												
Total	1,707	187	1,520	1,230	477	771	936	757	950	402	459	473
Mean	2.1	2.1	2.1	2.1	2.0	1.9	2.2	2.3	1.9	2.3	2.0	2.1
1976-81 retirements												
Total	786	107	679	588	198	469	317	335	451	220	228	159
Mean	0.9	1.2	0.9	1.0	0.8	1.2	0.8	1.0	0.9	1.2	1.0	0.7
1976-81 demand												
Total	2,493	294	2,199	1,818	675	1,240	1,253	1,092	1,401	622	687	632
Mean	3.0	3.4	3.0	3.1	2.9	3.1	3.0	3.3	2.8	3.5	3.0	2.8
Estimated 1976-81 average annual growth												
Department size	2.3	1.9	2.3	2.2	2.3	1.9	2.6	2.2	2.4	2.2	2.2	2.4
Retirement	1.1	1.1	1.1	1.1	1.0	1.2	0.9	1.0	1.2	1.2	1.1	0.8

[a] Date are based on those departments reporting both 1976 and 1981 faculty date. Data on the number of faculty positions are not weighted to population.

APP. E6 Estimated Predoctoral Enrollments in 1981-82--Basic Biomedical Sciences[a] (A2)

Predoctoral Enrollments	Total	Roose-Andersen Rating		Institution Control		Institution Type		Possession of Training Grant		Department Age		
		≥3.5	Other	Public	Private	Graduate	Medical	Yes	No	Old	Middle	Young
SURVEY WN (Departments)	1,324	158	1,166	896	428	648	676	527	797	274	338	367
RESPONSE N (Departments)	840	90	750	606	234	416	424	342	498	178	234	237
1976 predoctoral students												
Total	23,028	3,656	19,372	17,572	5,456	16,156	6,872	11,780	11,248	6,234	6,440	5,637
Mean	27.4	40.6	25.8	29.0	23.3	38.8	16.2	34.4	22.6	35.0	27.5	23.8
Estimated 1981 predoctoral students												
Total	25,625	3,790	21,835	19,373	6,252	17,736	7,889	12,546	13,079	6,539	7,157	6,423
Mean	30.5	42.1	29.1	32.0	26.7	42.6	18.6	36.7	26.3	36.7	30.6	27.1
1976-81 net change												
Total	2,597	134	2,463	1,801	796	1,580	1,017	766	1,831	305	717	786
Mean	3.1	1.5	3.3	3.0	3.4	3.8	2.4	2.2	3.7	1.7	3.1	3.3
Estimated average annual growth 1976-81 (%)	2.2	0.7	2.4	2.0	2.8	1.9	2.8	1.3	3.1	1.0	2.1	2.6

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[a] Data are based on those departments reporting both 1976 and 1981 predoctoral data. Data on the number of graduate students are not weighted to population.

APP. E7 Estimated Postdoctoral Levels in 1981-82--Basic Biomedical Sciences[a] (A2)

Postdoctorals	Total	Roose-Andersen Rating		Institution Control		Institution Type		Possession of Training Grant		Department Age		
		≥3.5	Other	Public	Private	Graduate	Medical	Yes	No	Old	Middle	Young
SURVEY N (Departments)	975	143	832	649	326	427	548	475	500	231	272	234
RESPONSE N (Departments)	546	75	471	387	159	232	314	293	253	137	158	130
1976 postdoctorals												
Total	3,923	1,263	2,660	2,429	1,494	1,945	1,978	2,949	974	1,379	1,008	748
Mean	7.2	16.8	5.6	6.3	9.4	8.4	6.3	10.1	3.8	10.1	6.4	5.8
Estimated 1981 postdoctorals												
Total	5,041	1,424	3,617	3,236	1,805	2,431	2,610	3,557	1,484	1,630	1,275	1,062
Mean	9.2	19.0	7.7	8.4	11.4	10.5	8.3	12.1	5.9	11.9	8.1	8.2
1976-81 net change												
Total	1,118	161	957	807	311	486	632	608	510	251	267	314
Mean	2.0	2.1	2.0	2.1	2.0	2.1	2.0	2.1	2.0	1.8	1.7	2.4
Estimated average annual growth 1976-81 (%)	5.1	2.4	6.3	5.9	3.9	4.6	5.7	3.8	8.8	3.4	4.8	7.3

[a] Data are based on those departments reporting both 1976 and 1981 postdoctoral data. Data on the number of postdoctorals are not weighted to population.

APP. E8 Departmental Limit on Predoctoral Admissions Based on Job Market--Basic Biomedical Sciences--Percent Distribution (A9)

Job Market Limit on Admissions	Total	Roose-Andersen Rating		Institution Control		Institution Type		Possession of Training Grant		Department Age		
		≥3.5	Other	Public	Private	Graduate	Medical	Yes	No	Old	Middle	Young
SURVEY WN	1,324	158	1,166	896	428	648	676	527	797	274	338	367
RESPONSE N	1,002	121	881	687	315	486	516	407	595	218	267	266
Yes (%)	29.2	27.4	29.5	30.9	25.7	22.2	35.9	29.7	28.9	27.7	27.5	33.4
No(%)	70.8	72.6	70.5	69.1	74.3	77.8	64.1	70.3	71.1	72.3	72.5	66.6

APP. E9 Departmental Limit on Predoctoral Admissions Based on Available Support--Basic Biomedical Sciences--Percent Distribution (A10)

Support Limit on Admissions	Total	Roose-Andersen Rating		Institution Control		Institution Type		Possession of Training Grant		Department Age		
		≥3.5	Other	Public	Private	Graduate	Medical	Yes	No	Old	Middle	Young
SURVEY WN	1,324	158	1,166	896	428	648	676	527	797	274	338	367
RESPONSE N	1,005	116	889	692	313	484	521	413	592	217	270	271
Yes (%)	68.8	84.0	66.8	66.3	74.1	66.5	71.0	74.0	65.5	70.7	70.4	68.3
No (%)	31.2	16.0	33.2	33.7	25.9	33.5	29.0	26.0	34.5	29.3	29.6	31.7
	If yes, primary source considered:											
RESPONSE N	694	97	597	459	235	320	374	307	387	152	195	183
Federal (%)	48.2	72.5	44.3	41.8	60.5	36.8	58.1	71.6	30.6	50.3	55.1	41.7
Inst./state (%)	49.7	26.7	53.4	55.6	38.5	62.4	38.6	27.3	66.5	49.7	42.7	55.8
Other (%)	2.1	0.8	1.3	2.4	1.0	0.8	3.3	1.1	2.9		2.2	2.5

APP. E10 Departmental Assurance of Tuition-Stipend Support for Predoctoral Students--Basic Biomedical Sciences--Percent Distribution (A11, A12)

Assurance of Tuition/ Stipend Support	Total	Roose-Andersen Rating		Institution Control		Institution Type		Possession of Training Grant		Department Age		
		≥3.5	Other	Public	Private	Graduate	Medical	Yes	No	Old	Middle	Young
SURVEY WN	1,324	158	1,166	896	428	648	676	527	797	274	338	367
RESPONSE N	1,011	122	889	690	321	491	520	412	599	217	269	271
Yes (%)	76.7	87.3	75.2	73.8	82.7	74.8	78.5	84.8	71.4	80.1	81.9	71.5
No (%)	23.3	12.7	24.8	26.2	17.3	25.2	21.5	15.2	28.6	19.9	18.1	28.5
	If support assured, then:											
Mean percent students supported	75.3	83.8	73.9	73.4	78.6	68.7	81.3	80.8	70.9	76.2	75.0	72.3
Mean years support assured	4.0	4.4	3.9	3.9	4.1	3.8	4.1	4.1	3.8	4.1	3.9	3.8

APP. E11 Departmental Restrictions on Nonacademic Employment--Basic Biomedical Sciences--Percent Distribution (A13)

Restrict Nonacademic Employment	Total	Roose-Andersen Rating		Institution Control		Institution Type		Possession of Training Grant		Department Age		
		≥3.5	Other	Public	Private	Graduate	Medical	Yes	No	Old	Middle	Young
SURVEY WN	1,324	158	1,166	896	428	648	676	527	797	274	338	367
RESPONSE N	993	120	873	679	314	478	515	406	587	206	265	268
Yes (%)	40.6	61.9	37.7	35.9	50.4	33.4	47.4	53.4	32.1	47.3	43.5	37.0
No (%)	59.4	38.1	62.3	64.1	49.6	66.6	52.6	46.6	67.9	52.7	56.5	63.0
	If yes, would permit nonacademic employment if support cut back:											
RESPONSE N	420	74	346	257	163	171	249	230	190	103	117	104
Yes (%)	58.3	54.2	59.3	65.8	47.1	59.5	57.5	59.3	57.2	63.9	58.3	60.4
No (%)	35.2	34.4	35.4	30.4	42.4	29.0	39.3	37.7	32.4	32.0	38.9	32.8
Unknown (%)	6.5	11.4	5.3	3.8	10.5	11.5	3.2	3.0	10.4	4.1	2.8	6.8

APP. E12 Departmental Perceptions of Labor Market for Recent Doctorates--Basic Biomedical Sciences--Percent Distribution (A14)

			Perception of Labor Market				
Fine Field	SURVEY N	RESPONSE N	Critical Shortage	Moderate Shortage	Market Balance	Moderate Surplus	Critical Surplus
TOTAL BASIC BIOMEDICAL SCIENCES	1,324	932	9.0	27.8	36.5	24.5	2.3
Biomedical engineering	28	20		32.0	64.0	4.0	
Anatomy	97	76	15.6	45.6	32.2	6.7	
Biochemistry	144	110	2.2	14.2	36.6	42.5	4.5
Biophysics	38	25		28.6	48.6	14.3	8.6
Microbiology	152	122	4.8	23.8	40.8	27.9	2.7
Pathology	88	44	12.7	42.3	38.0	7.0	
Pharmacology	125	95	9.4	41.9	35.5	10.3	2.6
Physiology	130	92	1.8	9.7	42.5	40.7	5.3
Biology	98	79	3.3	13.2	37.4	45.1	1.1
Biometry/ biostatistics	21	12		100.0			
Cell biology	24	18		22.7	40.9	36.4	
Genetics	42	30		19.4	50.0	27.8	2.8
Nutrition	54	41	23.5	41.2	33.3	2.0	
Zoology	59	47	5.2	13.8	27.6	46.6	6.9
Basic biosciences, NEC	53	38	6.1	16.3	38.8	38.8	
Neurosciences	16	4			50.0	50.0	
Pharmaceutical sciences	46	38	6.5	47.8	41.3	4.3	
Veterinary sciences	65	24	35.0	30.0	21.7	13.3	
Total health services research	44	17	47.4	47.4	5.3		
Public health/ preventive medicine	21	9	56.3	31.3	12.5		
Epidemiology	6	3	33.3	66.7			
Health services	17	5	43.8	56.3			

APP. E13 Departmental Perceptions of Labor Market for Recent Postdoctorals with Ph.D.'s--Basic Biomedical Sciences--Percent Distribution (A14)

			Perception of Labor Market				
Fine Field	SURVEY WN	RESPONSE N	Critical Shortage	Moderate Shortage	Market Balance	Moderate Surplus	Critical Surplus
TOTAL BASIC BIOMEDICAL SCIENCES	975		7.3	28.9	35.3	25.6	3.0
Biomedical engineering	13	11		30.8	46.2	23.1	
Anatomy	66	57	16.9	56.9	20.0	6.2	
Biochemistry	135	97	2.5	9.2	35.3	46.2	6.7
Biophysics	34	23		19.4	45.2	22.6	12.9
Microbiology	120	96	2.6	20.2	48.2	25.4	3.5
Pathology	70	38	11.5	44.3	29.5	14.8	
Pharmacology	103	84	12.7	45.1	25.5	15.7	1.0
Physiology	114	79	3.1	12.2	43.9	34.7	6.1
Biology	64	44	2.0	16.3	40.8	38.8	2.0
Biometry/ biostatistics	6	3		75.0	25.0		
Cell biology	19	13		13.3	26.7	60.0	
Genetics	27	19	4.5	31.8	40.9	22.7	
Nutrition	33	26	13.3	43.3	33.3	10.0	
Zoology	47	29	3.0	21.2	36.4	36.4	3.0
Basic biosciences, NEC	38	24		20.0	46.7	30.0	3.3
Neurosciences	8	3			33.3	66.7	
Pharmaceutical sciences	27	25	6.9	37.9	51.7	3.4	
Veterinary sciences	33	13	32.3	45.2	16.1	6.5	
Total health services research	18	10	22.7	77.3			
Public health/ preventive medicine	10	5	33.3	66.7			
Epidemiology	6	3	33.3	66.7			
Health services	2	2		100.0			

APP. E14 Departmental Perceptions of Labor Market for Recent Postdoctorals with M.D.'s--Basic Biomedical Sciences--Percent Distribution (A14)

Fine Field	RESPONSE N^a	Percent of Labor Market Critical Shortage	Moderate Shortage	Market Balance	Moderate Surplus	Critical Surplus
TOTAL BASIC BIOMEDICAL SCIENCES	265	38.6	40.3	18.1	2.5	0.6
Biomedical engineering	4	50.0	25.0	25.0		
Anatomy	30	47.1	41.2	8.8	2.9	
Biochemistry	25	3.4	41.4	55.2		
Biophysics	7	36.4	36.4	27.3		
Microbiology	35	18.2	59.1	13.6	9.1	
Pathology	38	37.7	39.3	23.0		
Pharmacology	43	55.6	40.7	3.7		
Physiology	34	15.9	45.5	27.3	9.1	2.3
Biology	5	60.0	40.0			
Biometry/ biostatistics						
Cell biology	5	16.7	66.7	16.7		
Genetics	8	44.4	44.4	11.1		
Nutrition	4	25.0	25.0	50.0		
Zoology	2	50.0				50.0
Basic biosciences, NEC	2	50.0	50.0			
Neurosciences	1	100.0				
Pharmaceutical sciences	1		100.0			
Veterinary sciences	11	78.6	21.4			
Total health services research	10	83.3	16.7			
Public health/ preventive medicine	5	77.8	22.2			
Epidemiology	3	100.0				
Health services	2	66.7	33.3			

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[a] Number of departments with post-M.D.'s in the survey population. NN is unknown.

APP. E15 Future Adjustments by Departments to Worsening Job Market--Basic Biomedical Sciences--Percent Responding[a] (A17)

Adjustment to Worsening Job Market	Total	Roose-Andersen Rating		Institution Control		Institution Type		Possession of Training Grant		Department Age		
		≥3.5	Other	Public	Private	Graduate	Medical	Yes	No	Old	Middle	Young
SURVEY WN	1,324	158	1,166	896	428	648	676	527	797	274	338	367
RESPONSE N	995	114	881	686	309	482	513	409	586	213	268	266
Some adjustment	95.5	97.3	95.3	96.2	93.9	94.9	96.1	96.9	94.6	96.2	96.1	95.5
Provide market information	75.8	75.5	75.8	77.8	71.5	77.5	74.2	77.6	74.6	76.1	74.0	78.5
Limit enrollment	72.2	75.5	71.8	73.6	69.3	67.8	76.6	76.1	69.7	75.8	73.7	73.2
Reduce support	11.2	10.2	11.3	9.4	14.9	9.0	13.2	10.7	11.5	8.3	11.6	10.3
Emphasize masters	13.4	3.4	14.7	14.0	12.2	16.2	10.8	8.6	16.6	9.8	13.4	12.8
Other	4.7	1.4	5.1	5.2	3.4	3.5	5.8	3.7	5.3	4.5	5.1	2.2
No adjustment	6.1	5.4	6.2	4.6	9.5	6.0	6.2	4.7	7.1	4.9	5.7	5.3

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[a] Multiple responses lead to sums of greater than 100 percent.

APP. B16 Departmental Perceptions of Change in Postdoctoral Status--Basic Biomedical Sciences--Percent Distribution (A18)

Fine Field	SURVEY WN	RESPONSE N	Change in Time on Postdoctoral Status		If Yes, Time . . .		If Lengthened, Because of . . .			Poor Job as Percent of Total Response
			No	Yes[a]	Shortened	Lengthened	Increased Support	Professional Incentives	Poor Job Market	
TOTAL BASIC BIOMEDICAL SCIENCES	975	721	71.9	28.1	9.8	88.7	7.5	26.9	55.5	13.8
Biomedical engineering	13	10	91.7	8.3[a]						
Anatomy	66	55	84.1	15.9	20.0	80.0		62.5	37.5	4.8
Biochemistry	135	106	53.5	46.5	6.7	91.7	3.6	12.7	74.5	31.8
Biophysics	34	25	54.5	45.5	6.7	93.3	14.3	7.1	50.0	21.2
Microbiology	120	94	71.7	28.3		96.9	16.1	22.6	58.1	15.9
Pathology	70	40	82.0	18.0	18.2	81.8		77.8	22.2	3.3
Pharmacology	103	81	76.0	24.0	12.5	87.5	9.5	33.3	42.9	9.0
Physiology	114	83	77.7	22.3	13.0	87.0		35.0	55.0	10.7
Biology	64	50	80.0	20.0		100.0		18.2	72.7	14.5
Biometry/biostatistics	6	5	83.3	16.7[a]						
Cell biology	19	15	44.4	55.6		100.0		20.0	60.0	33.3
Genetics	27	20	78.3	21.7	40.0	60.0			66.7	8.7
Nutrition	33	25	66.7	33.3	40.0	60.0	16.7	66.7		
Zoology	47	36	68.2	31.8	14.3	85.7		16.7	75.0	20.5
Basic biosciences, NEC	38	28	69.4	30.6	9.1	72.7	37.5	12.5	25.0	5.6
Neurosciences	8	2		100.0[a]						
Pharmaceutical sciences	27	23	84.0	16.0[a]						
Veterinary sciences	33	13	84.8	15.2[a]						
Total health services research	18	10	94.4	5.6[a]						
Public health/ preventive medicine	10	6	90.0	10.0[a]						
Epidemiology	6	3	100.0							
Health services	2	1	100.0							

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[a] Base less than 5; further percentages not shown.

APP. E17 Characteristics of Training Grant Departments--Basic Biomedical Sciences--Percent Distribution

		Roose-Andersen Rating		Institution Control		Institution Type		Department Age		
Training Grant Status	Total	≥3.5	Other	Public	Private	Graduate	Medical	Old	Middle	Young
SURVEY WN	1,324	158	1,166	896	428	648	676	274	338	367
RESPONSE N	1,019	122	897	697	322	494	525	218	270	272
Departments with training grants										
Total	42.7	78.5	37.9	39.3	50.0	36.9	48.4	62.0	51.2	32.4
Trainees increased	20.9	37.3	18.7	19.1	24.8	16.8	24.9	25.2	24.0	19.9
Trainees decreased	16.7	34.8	14.2	16.2	17.8	16.4	17.0	28.8	22.2	9.0
No change	3.1	3.2	3.1	2.9	3.5	2.6	3.6	5.1	4.1	1.4
Unknown	2.0	3.2	1.9	1.1	4.0	1.1	3.0	2.9	0.9	2.2
Departments without training grants										
Total	57.3	21.5	62.1	60.7	50.0	63.1	51.6	38.0	48.8	67.6
Ratio of departments										
With/without training grants	0.75	3.65	0.61	0.65	1.0	0.58	0.94	1.63	1.05	0.48
Increased/decreased trainees	1.25	1.07	1.31	1.18	1.39	1.03	1.46	.67	1.08	2.2

APP. E18 Mean Percent Departmental Faculty Applied for/Held NIH/ADAMHA/HRA Research/Training Grants by Training Grant Status of Department, 1976--Basic Biomedical Sciences (A5)

Faculty Applied for/ Held NIH/ADAMHA/HRA Support	All Departments	Total	Trainees Increased	Trainees Decreased	Trainees No Change	Change Unknown	Departments without Training Grants
SURVEY WN	1,324	566	277	221	41	27	758
RESPONSE N	945	419	202	166	31	20	526
Mean faculty (%)	44.8	55.1	56.2	51.5	56.1	72.2	36.6

APP. E19.1 Change in Primary Source and Type of Support for Full-time Predoctoral Students by Training Grant Status of Department, 1973, 1976--Basic Biomedical Sciences--Number of Students[a]

Source and Type of Support	All Departments		Departments with Training Grants: Total		Trainees Increased		Trainees Decreased		Departments without Training Grants	
	1973	1976	1973	1976	1973	1976	1973	1976	1973	1976
SURVEY NN (Departments)	1,324	1,324	556	556	277	277	221	221	758	758
RESPONSE N (Departments)	800	800	377	377	153	153	131	131	423	423
ALL SOURCES										
Total	19,855	22,883	11,096	12,395	3,932	4,829	4,646	4,797	8,759	10,438
Fellow/trainee	6,450	5,862	5,109	4,719	2,014	2,178	2,169	1,800	1,341	1,143
Research assistant	3,673	4,711	1,941	2,576	526	879	963	1,151	1,732	2,135
Teaching assistant	4,878	5,714	1,868	2,143	575	627	731	858	3,010	3,571
Other	4,854	6,546	2,178	2,957	817	1,145	783	988	2,676	3,589
Total federal										
Total	6,925	7,307	5,362	5,538	1,883	2,352	2,493	2,244	1,563	1,769
Fellow/trainee	4,585	3,900	4,024	3,573	1,516	1,670	1,809	1,367	561	327
Research assistant	2,143	2,975	1,232	1,759	329	599	631	812	911	1,216
Teaching assistant	68	131	50	73	16	26	33	27	18	58
Other	129	301	56	133	22	57	20	38	73	168
NIH										
Total	4,830	5,064	4.179	4,227	1,535	1,855	1,891	1,659	651	837
Fellow/trainee	3,590	3,126	3,374	2,963	1,275	1,369	1,507	1,108	216	163
Research assistant	1,178	1,760	761	1,193	239	460	361	528	417	567
Teaching assistant	27	67	17	28	6	9	11	6	10	39
Other	35	111	27	43	15	17	12	17	8	68
Total nonfederal										
Total	12,930	15.526	5,734	6,857	2,049	2,477	2,153	2,553	7,196	8,669
Fellow/trainee	1,865	1,962	1,085	1,146	498	508	360	433	780	816
Research assistant	1,530	1,736	709	817	197	280	332	339	821	919
Teaching assistant	4,810	5,583	1,818	2,070	559	601	698	831	2,992	3,513
Other	4,725	6,245	2,122	2,824	795	1,088	763	950	2,603	3,421
Institution/state										
Total	7,569	8.676	3,226	3,745	1,139	1,355	1.248	1,445	4,343	4,931
Fellow/trainee	1,319	1,436	704	841	324	387	239	290	615	595
Research assistant	1,122	1,269	531	620	153	234	262	265	591	649
Teaching assistant	4,754	5,477	1,817	2,035	559	600	697	824	2,937	3,442
Other	374	494	174	249	103	134	50	66	200	245
Self	4,004	5,297	1,764	2,380	601	860	688	796	2,240	2,917

[a] Support data from NSF (1973-76). Data are based on those departments reporting both 1973 and 1976 full-time students. Numbers therefore understate actual student population.

APP. E19.2 Change in Primary Source and Type of Support for Full-time Predoctoral Students by Training Grant Status of Department, 1973-76--Basic Biomedical Sciences--Percent Change[a]

Source and Type of Support	All Departments	Departments with Training Grants: Total	Departments with Training Grants: Trainees Increased	Departments with Training Grants: Trainees Decreased	Departments without Training Grants
SURVEY NN (Departments)	1,324	556	277	221	758
RESPONSE N (Departments)	800	377	153	131	423
ALL SOURCES					
Total	15.0	11.7	22.8	3.3	19.2
Fellow/trainee	-9.1	-7.6	8.1	-17.0	-14.8
Research assistant	28.3	32.7	67.1	19.5	23.3
Teaching assistant	17.1	14.7	9.0	17.4	18.6
Other	34.9	23.9	40.1	26.2	34.1
Total federal					
Total	5.5	3.3	24.9	-10.0	13.2
Fellow/trainee	-14.9	-11.2	10.2	-24.4	-41.7
Research assistant	38.8	42.8	82.1	28.7	33.5
Teaching assistant					
Other					
NIH					
Total	4.8	1.1	20.8	-12.3	28.6
Fellow/trainee	-12.9	-12.2	7.4	-26.5	-24.5
Research assistant	49.4	56.8	92.5	46.3	36.0
Teaching assistant					
Other					
Total nonfederal					
Total	20.1	19.6	20.9	18.6	20.5
Fellow/trainee	5.2	5.6	2.0	20.3	4.6
Research assistant	13.5	15.2	42.1	2.1	11.9
Teaching assistant	16.1	13.9	7.5	19.1	17.4
Other	32.2	33.1	36.9	24.5	31.4
Institution/state					
Total	14.6	16.1	28.1	15.8	13.5
Fellow/trainee	8.9	19.5	19.4	21.3	-3.3
Research assistant	13.1	16.8	52.9	1.1	9.8
Teaching assistant	15.2	16.4	7.3	18.2	17.2
Other	32.1	43.1	30.1	32.0	22.5
Self	32.3	34.9	46.4	15.7	30.2

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[a] Support data from NSF (1973-76). Data are based on those departments reporting both 1973 and 1976 full-time graduate students.

APP. E19.3 Change in Primary Source and Type of Support for Full-time Predoctoral Students by Training Grant Status of Department, 1973-76--Basic Biomedical Sciences--Percent Distribution[a]

Source and Type of Support	All Departments		Departments with Training Grants						Departments without Training Grants	
			Total		Trainees Increased		Trainees Decreased			
	1973	1976	1973	1976	1973	1976	1973	1976	1973	1976
SURVEY NN (Departments)	1,324	1,324	556	556	277	277	221	221	758	758
RESPONSE N (Departments)	800	800	377	377	153	153	131	131	423	423
ALL SOURCES										
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Fellow/trainee	32.5	25.7	46.0	38.1	51.2	45.1	46.7	37.5	15.3	11.0
Research assistant	18.5	20.6	17.5	20.8	13.4	18.2	20.7	24.0	19.8	20.5
Teaching assistant	24.6	25.0	16.8	17.3	14.6	13.0	15.7	17.9	34.4	34.2
Other	24.4	28.7	19.6	23.9	20.8	23.7	16.9	20.6	30.6	34.4
Total federal										
Total	34.9	32.0	48.3	44.7	47.9	48.7	53.7	46.8	17.8	16.9
Fellow/trainee	23.1	17.1	36.3	28.8	38.6	34.6	38.9	28.5	6.4	3.1
Research assistant	10.8	13.0	11.1	14.2	8.4	12.4	13.6	16.9	10.4	11.6
Teaching assistant	0.3	0.6	0.5	0.6	0.4	0.5	0.7	0.6	0.2	0.6
Other	0.6	1.3	0.5	1.1	0.6	1.2	0.4	0.8	0.8	1.6
NIH										
Total	24.3	22.2	37.7	34.1	39.0	38.4	40.7	34.6	7.4	8.0
Fellow/trainee	18.1	13.7	30.4	23.9	32.4	28.3	32.4	23.1	2.5	1.6
Research assistant	5.9	7.7	6.9	9.6	6.1	9.5	7.8	11.0	4.8	5.4
Teaching assistant	0.1	0.3	0.2	0.2	0.2	0.2	0.2	0.1	0.1	0.4
Other	0.1	0.5	0.2	0.3	0.4	0.4	0.3	0.4	0.1	0.7
Total nonfederal										
Total	65.1	68.0	51.7	55.3	51.2	51.3	46.3	53.2	82.2	83.1
Fellow/trainee	9.4	8.6	9.8	9.2	12.7	10.5	7.7	9.0	8.9	7.8
Research assistant	7.7	7.6	6.4	6.6	5.0	5.8	7.1	7.1	9.4	8.8
Teaching assistant	24.2	24.5	16.4	16.7	14.2	12.4	15.0	17.3	34.2	33.7
Other	23.8	27.4	19.1	22.8	20.2	22.5	16.4	19.8	29.7	32.8
Institution/state										
Total	40.3	46.4	29.1	30.2	29.0	28.1	26.9	30.1	49.6	47.2
Fellow/trainee	6.6	6.3	6.3	6.8	8.2	8.0	5.1	6.0	7.0	5.7
Research assistant	5.7	5.6	4.8	5.0	3.9	4.8	5.6	5.5	6.7	6.2
Teaching assistant	23.9	24.0	16.4	16.4	14.2	12.4	15.0	17.2	33.5	33.0
Other	1.9	2.2	1.6	2.0	2.6	2.8	1.1	1.4	2.3	2.3
Self	20.2	23.2	15.9	19.2	15.3	18.2	14.8	16.6	25.6	27.9

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[a] Support data from NSF (1973-76). Data are based on those departments reporting both 1973 and 1976 full-time graduate students.

APP. E20 Change in Primary Source and Type of Support for Full-time Predoctoral Students for Departments Losing NIH/ADAMHA/HRA Traineeships by Trend in Enrollments, 1973-76--Basic Biomedical Sciences[a]

Source and Type of Support	Departments Where Trainees Declined, Enrollments Declined					Departments Where Trainees Declined, Enrollments Increased				
	Number of Students		Percent Distribution		Percent Change	Number of Students		Percent Distribution		Percent Change
	1973	1976	1973	1976	1973-76	1973	1976	1973	1976	1973-76
Response N (Departments)	77	77	77	77	77	44	44	44	44	44
ALL SOURCES										
Total	2,521	2,308	100.0	100.0	-8.4	1,823	2,166	100.0	100.0	18.8
Fellow/trainee	1,229	962	48.8	41.7	-21.7	816	744	44.8	34.3	-8.8
Research assistant	551	612	21.9	26.5	11.1	329	463	18.0	21.4	40.7
Teaching assistant	437	460	17.3	19.9	5.3	249	330	13.7	15.2	32.5
Other	304	274	12.1	11.9	-9.9	429	629	23.5	29.0	46.6
Total federal										
Total	1,416	1,200	56.2	52.0	-15.3	900	903	49.4	41.7	.3
Fellow/trainee	1,034	727	41.0	31.5	-29.7	659	560	36.1	25.9	-15.0
Research assistant	363	452	14.4	19.6	24.5	211	307	11.6	14.2	45.5
Teaching assistant	12	8	0.5	0.3		21	19	1.2	0.9	
Other	7	14	0.3	0.6		9	17	0.5	0.8	
NIH										
Total	1,019	902	40.4	39.1	-11.5	732	633	40.2	29.2	-13.5
Fellow/trainee	832	604	33.0	26.2	-27.4	580	427	31.8	19.7	-26.4
Research assistant	178	285	7.1	12.3	60.1	138	203	7.6	9.4	47.1
Teaching assistant	4	6	0.2	0.3		7		0.4		
Other	5	7	0.2	0.7		7	3	0.4	0.1	
Total nonfederal										
Total	1,105	1,108	43.8	48.0	0.3	923	1,263	50.6	58.3	36.8
Fellow/trainee	195	236	7.7	10.2	21.0	157	184	8.6	8.5	17.2
Research assistant	188	160	7.5	6.9	14.9	118	156	6.5	7.2	32.2
Teaching assistant	425	452	16.9	19.6	6.4	228	311	12.5	14.4	36.4
Other	297	260	11.8	11.3	-12.5	420	612	23.0	28.3	45.7
Institution/state										
Total	747	790	29.6	34.2	5.8	422	543	23.1	25.1	28.7
Fellow/trainee	152	192	6.0	8.3	26.3	79	89	4.3	4.1	12.7
Research assistant	149	125	5.9	5.4	16.1	97	118	5.3	5.4	21.6
Teaching assistant	425	449	16.9	19.5	5.6	227	310	13.5	14.3	36.6
Other	21	24	0.8	1.0	14.3	19	26	1.0	1.2	36.8
Self	263	201	10.4	8.7	-23.6	389	536	21.3	24.7	37.8

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[a] Support data from NSF (1973-76). Data are based on those departments reporting both 1973 and 1976 full-time students. Numbers therefore understate actual student population.

APP. E21 Primary Reason Given by Departments for Enrollment Decrease When Trainees Decreased--Basic Biomedical Sciences--Percent Distribution (C5)

Trainees Decreased--Reason for Enrollment Decrease	Total	Roose-Andersen Rating		Institution Control		Institution Type		Department Age		
		≥3.5	Other	Public	Private	Graduate	Medical	Old	Middle	Young
SURVEY WN	133	34	99	81	52	54	79	43	47	18
RESPONSE N	87	22	65	54	33	34	53	27	31	11
No stipend support	74.5	74.1	74.7	64.6	90.2	74.4	74.6	73.5	69.4	76.9
Limit on self-supported students	6.6	3.7	7.6	7.7	4.9	9.3	4.8	11.8	8.3	
Poor job market	1.9	3.7	1.3	3.1		2.3	1.6	2.9	2.8	
Fewer quality applicants	11.3	7.4	12.7	15.4	4.9	4.7	15.9	2.9	13.9	23.1
Other	5.6	11.1	3.8	9.2		9.3	3.2	8.8	5.6	

APP. E22 Primary Reason Given by Departments for Enrollment Increase When Trainees Decreased--Basic Biomedical Sciences--Percent Distribution (CS)

Trainees Decreased--Reason for Enrollment Increase	Total	Roose-Andersen Rating		Institution Control		Institution Type		Department Age		
		>3.5	Other	Public	Private	Graduate	Medical	Old	Middle	Young
SURVEY WN	83	20	63	54	29	47	36	33	22	12
RESPONSE N	59	14	45	39	20	33	26	20	20	8
Alternative Fellowships/ traineeships	14.3	23.1	12.0	7.3	27.3	8.6	21.4	13.0	19.0	
More research grants	19.0	30.8	16.0	22.0	13.6	11.4	28.6	17.4	23.8	12.5
More self-supported students	33.3	15.4	38.0	41.5	18.2	42.9	21.4	26.1	42.9	12.5
More quality applicants	15.9		20.0	17.1	13.6	14.3	17.9	13.0	9.5	50.0
Need higher degree										
Manpower shortage	1.6	7.7		2.4		2.9				12.5
Other	15.9	23.1	14.0	10.0	27.3	20.0	10.7	30.4	4.8	12.5

APP. E23 Impact of Lost Institutional Support from Training Grants on Departmental Program Activities, by Current and Potential Impact --Basic Biomedical Sciences--Percent Distribution (C9, C10)

Program Activity	Experienced Impact, 1972-75				Potential Impact of Elimination			
	Response N	Little or None	Moderate Cutback	Severe Curtailment	Response N	Little or None	Moderate Cutback	Severe Curtailment
Teaching courses	193	76.1	22.7	1.3	317	52.0	31.3	16.7
Special seminars	197	43.6	44.9	11.5	326	24.9	36.5	38.7
Interdisciplinary training	182	49.8	36.3	13.9	312	25.2	34.3	40.6
Student research support	200	18.5	43.2	38.3	335	17.9	36.0	46.1
Academic staff	190	53.9	34.9	11.2	316	52.3	28.5	19.2
Program support staff	192	28.2	51.3	20.6	319	25.1	41.1	33.8
Travel to professional meetings	192	25.6	36.8	37.6	327	27.4	30.8	41.8
Other	22	37.5	20.8	41.7	68	24.7	14.8	60.5

APP. E24 Departmental Ranking of Quality of Predoctoral NIH/ADAMHA/HRA Trainees in Their Department--Basic Biomedical Sciences--Percent Distribution (B2)

Quality of Predoctoral Trainees	Total	Roose-Andersen Rating		Institution Control		Institution Type		Department Age		
		≥3.5	Other	Public	Private	Graduate	Medical	Old	Middle	Young
SURVEY WN	435	106	329	257	178	191	244	138	130	90
RESPONSE N	339	84	255	200	139	146	193	111	99	66
Better than average	62.7	58.8	63.9	61.2	64.8	63.0	62.4	59.6	63.5	67.0
No difference	36.9	41.2	35.5	38.4	34.7	36.4	37.2	40.4	36.5	31.8
Below average	0.5		0.6	0.4	0.6	0.5	0.4			1.1

APP. E25 Primary Reason for 1974-76 Predoctoral Enrollment Change--Behavioral Sciences--Percent Distribution (A2, A4)

Primary Reason for Predoctoral Change	Total	Roose-Andersen Rating		Institution Control		Institution Type		Department Age		
		≥3.5	Other	Public	Private	Yes	No	Old	Middle	Young
INCREASE (N)	135	8	127	95	40	47	88	28	32	53
TOTAL	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Federal fellowships/ traineeships	12.8	9.1	13.0	10.8	18.0	16.4	10.9	27.0	12.2	2.7
Federal research grants	4.4		4.7	3.1	8.0	1.6	5.9		2.4	6.7
Institution/state	10.0		10.7	13.1	2.0	14.8	7.6		17.1	13.3
Number of applicants	21.7	18.2	21.9	23.1	18.0	16.4	24.4	18.9	22.0	26.7
Quality of applicants	22.2	36.4	21.3	26.2	12.0	18.0	24.4	16.2	22.0	24.0
Demand for graduates	6.1		6.5	5.4	8.0	11.5	3.4	8.1	2.4	4.0
Professional school competition										
Faculty size	4.4	9.1	4.1	4.6	4.0	1.6	5.9	10.8	2.4	4.0
Other	18.3	27.3	17.8	13.8	30.0	19.7	17.6	18.9	19.5	18.7
DECREASE (N)	124	15	109	74	50	57	67	30	35	37
TOTAL	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Federal fellowships/ traineeships	22.6	30.0	21.5	20.0	26.1	40.8	6.8	33.3	33.3	9.8
Federal research grants	4.3		4.9	3.2	5.8	5.3	3.4	7.7	2.2	2.0
Institution/state	16.5	20.0	16.0	22.1	8.7	11.8	20.5	15.4	8.9	23.5
Number of applicants	13.4	10.0	13.9	11.6	15.9	9.2	17.0	15.4	8.9	19.6
Quality of applicants	4.3		4.9	3.2	5.8	3.9	5.4	10.3		2.0
Demand for graduates	14.0	25.0	12.5	12.5	11.6	13.2	14.8	7.7	13.3	11.8
Professional school competition	0.6		0.7	1.1		1.3				
Faculty size	9.1	10.0	9.0	11.6	5.8	2.6	14.8	2.6	17.8	9.8
Other	15.2	5.0	16.7	15.0	14.5	11.8	18.2	7.7	15.6	21.6
NO CHANGE (N)	20	1	19	17	3	6	14	5	2	6
SURVEY WN	474	51	423	317	157	184	290	109	113	162

APP. E26 Primary Reason for Change in Number of Postdoctorals, 1974-76--Behavioral Sciences--Percent Distribution[a] (A2, A4)

Primary Reason for Postdoctoral Change	Total	Roose-Andersen Rating		Institution Control		Possession of Training Grant		Department Age		
		$\geq$3.5	Other	Public	Private	Yes	No	Old	Middle	Young
INCREASE (N)	36	7	29	16	20	25	11	13	10	9
TOTAL	100.0									
Federal fellowships/ traineeships	57.4									
Federal research grants	27.7									
Institution/state	2.1									
Number of applicants	2.1									
Quality of applicants	2.1									
Demand for graduates	4.3									
Professional school competition										
Faculty size										
Other	4.3									
DECREASE (N)	20	2	18	14	6	14	6	7	5	3
TOTAL	100.0									
Federal fellowships/ traineeships	44.4									
Federal research grants	22.2									
Institution/state	11.1									
Number of applicants	18.5									
Quality of applicants										
Demand for graduates										
Professional school competition										
Faculty size										
Other	3.7									
NO CHANGE (N)	6									
SURVEY WN	179	28	151	112	67	111	68	58	42	45

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[a] Insufficient responses present in order for statistics to be meaningful for department character type.

APP. E27 Estimated New Faculty Positions Available in 1981-82--Behavioral Sciences[a] (A2, A6)

	Total	Roose-Andersen Rating		Institution Control		Possession of Training Grant		Department Age		
		≥3.5	Other	Public	Private	Yes	No	Old	Middle	Young
SURVEY WN (Departments)	474	51	423	317	157	184	290	109	113	162
RESPONSE N (Departments)	285	28	257	196	89	109	176	65	73	100
1976 faculty										
Total	6,800	932	5,868	4,929	1,871	3,303	3,297	2,056	1,737	2,023
Mean	23.9	33.3	22.8	25.1	21.0	30.3	19.9	31.6	23.8	20.2
Estimated 1981 faculty										
Total	7,129	988	6,141	5,236	1,893	3,451	3,678	2,141	1,810	2,128
Mean	25.0	35.3	23.9	26.7	21.3	31.7	20.9	32.9	24.8	21.3
1976-81 net change										
Total	329	56	273	307	22	148	131	85	73	105
Mean	1.2	2.0	1.1	1.6	0.2	1.4	1.0	1.3	1.0	1.0
1976-81 retirements										
Total	292	34	258	200	92	133	159	95	84	73
Mean	1.0	1.2	1.0	1.0	1.0	1.2	0.9	1.5	1.2	0.7
1976-81 demand										
Total	621	90	531	507	114	281	340	180	157	178
Mean	2.2	3.2	2.1	2.6	1.3	2.6	1.9	2.8	2.2	1.8
Estimated 1976-81 average annual growth										
Department size	1.0	1.2	0.9	1.2	0.2	0.9	1.0	0.8	0.8	1.0
Retirement	0.9	0.7	0.9	0.8	1.0	0.8	0.9	0.9	0.9	0.7

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[a] Data are based on those departments reporting both 1976 and 1981 faculty data. Data on the number of faculty positions are not weighted to population.

APP. E28 Estimated Predoctoral Enrollments in 1981-82--Behavioral Sciences[a] (A2)

		Roose-Andersen Rating		Institution Control		Possession of Training Grant		Department Age		
	Total	≥3.5	Other	Public	Private	Yes	No	Old	Middle	Young
SURVEY WN (Departments)	474	51	423	317	157	184	290	109	113	162
RESPONSE N (Departments)	295	33	262	203	92	118	177	69	75	101
1976 predoctoral students										
Total	23,724	3,886	19,838	16,387	7,337	11,358	12,366	7,788	5,869	6,921
Mean	80.4	117.8	75.7	80.7	79.8	96.3	69.9	112.9	78.3	68.5
Estimated 1981 predoctoral students										
Total	23,718	3,846	19,872	16,618	7,100	11,323	12,395	7,478	5,868	7,151
Mean	80.4	116.5	75.8	81.9	77.2	96.0	70.0	108.4	78.2	70.8
1976-81 net change										
Total	-6	-40	34	231	-237	-35	29	-310	-1	230
Mean	-0.0	-1.2	0.1	1.1	-2.6	-0.3	0.2	-4.5	-0.0	2.3
Estimated average annual growth (%)	-0.0	-0.2	0.0	0.3	-0.7	-0.1	0.0	-0.8	-0.0	0.7

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[a] Data are based on those departments reporting both 1976 and 1981 predoctoral data. Data on the number of graduate students are not weighted to population.

APP. E29 Estimated Postdoctoral Levels in 1981-82--Behavioral Sciences[a] (A2)

		Roose-Andersen Rating		Institution Control		Possession of Training Grant		Department Age		
	Total	≥3.5	Other	Public	Private	Yes	No	Old	Middle	Young
SURVEY WN (Departments)	179	28	151	112	67	111	68	58	42	45
RESPONSE N (Departments)	74	13	61	43	31	51	23	32	19	13
1976 postdoctorals										
Total	296	75	221	104	192	198	98	104	98	64
Mean	4.0	5.8	3.6	2.4	6.2	3.9	4.3	3.3	5.2	4.9
Estimated 1981 postdoctoral										
Total	395	99	296	160	235	273	122	139	116	87
Mean	5.3	7.6	4.9	3.7	7.6	5.4	5.3	4.3	6.1	6.7
1976-81 net change										
Total	99	24	75	56	43	75	24	35	18	23
Mean	1.3	1.8	1.2	1.3	1.4	1.5	1.0	1.1	0.9	1.8
Estimated average annual growth (%)	5.9	5.7	6.0	9.0	4.1	6.6	4.5	6.0	3.4	6.3

[a] Data are based on those departments reporting both 1976 and 1981 postdoctoral data. Data on the number of postdoctorals are not weighted to population.

APP. E30 Departmental Limit on Predoctoral Admissions Based on Job Market--Behavioral Sciences--Percent Distribution (A9)

Job Market Limit on Admissions	Total	Roose-Andersen Rating		Institution Control		Possession of Training Grant		Department Age		
		≥3.5	Other	Public	Private	Yes	No	Old	Middle	Young
SURVEY WN	474	51	423	317	157	184	290	109	113	162
RESPONSE N	357	40	317	239	118	139	218	83	87	119
Yes (%)	42.4	47.1	41.9	44.3	38.7	46.7	39.7	48.6	38.9	43.8
No (%)	57.6	52.9	58.1	55.7	61.3	53.3	60.3	51.4	61.1	56.2

APP. E31 Departmental Limit on Predoctoral Admissions Based on Available Support--Behavioral Sciences--Percent Distribution (A10)

		Roose-Andersen Rating		Institution Control		Possession of Training Grant		Department Age		
Support Limit on Admissions	Total	≥3.5	Other	Public	Private	Yes	No	Old	Middle	Young
SURVEY WN	474	51	423	317	157	184	290	109	113	162
RESPONSE N	356	40	316	239	117	139	217	84	87	118
Yes (%)	51.5	47.1	52.0	49.4	55.8	62.4	44.4	56.9	45.1	48.1
No (%)	48.5	52.9	48.0	50.6	44.2	37.4	55.6	43.1	54.9	51.9
	If yes, primary source considered:									
RESPONSE N	184	19	165	120	64	87	97	47	41	57
Federal (%)	33.2	63.6	30.0	29.7	39.5	53.8	15.4	49.2	41.7	11.1
Institution/state (%)	64.6	36.4	67.6	66.9	60.5	46.2	80.5	50.8	56.3	83.3
Other (%)	2.2		2.4	3.4			4.1		2.1	5.6

APP. E32 Departmental Assurance of Tuition-Stipend Support for Predoctoral Students--Behavioral Sciences--Percent Distribution (A11, A12)

Assurance of Tuition/Stipend Support	Total	Roose-Andersen Rating		Institution Control		Possession of Training Grant		Department Age		
		≥3.5	Other	Public	Private	Yes	No	Old	Middle	Young
SURVEY WN	474	51	423	317	157	184	290	109	113	162
RESPONSE N	358	39	319	240	118	140	218	84	87	119
Yes (%)	77.8	82.0	77.3	76.3	80.8	87.5	71.5	81.7	78.8	71.4
No (%)	22.2	18.0	22.7	23.7	19.7	12.5	28.5	18.3	21.2	28.6
	If support assured, then:									
Mean percent students supported	58.6	52.7	59.4	57.5	60.8	62.8	55.3	61.9	54.3	56.2
Mean years support assured	3.3	3.2	3.3	3.3	3.1	3.5	3.0	3.4	3.1	3.3

APP. E33 Departmental Restrictions on Nonacademic Employment--Behavioral Sciences--Percent Distribution (A13)

Restrict Nonacademic Employment	Total	Roose-Andersen Rating		Institution Control		Possession of Training Grant		Department Age		
		≥3.5	Other	Public	Private	Yes	No	Old	Middle	Young
SURVEY WN	474	51	423	317	157	184	290	109	113	162
RESPONSE N	350	39	311	235	115	137	213	84	85	114
Yes (%)	27.6	28.0	27.6	22.1	38.8	33.9	23.6	22.9	24.5	31.4
No (%)	72.4	72.0	72.4	77.9	61.2	66.1	76.4	77.1	75.5	68.6
	If yes, would permit nonacademic employment if support cut back:									
RESPONSE N	97	12	85	51	46	48	49	20	22	35
Yes (%)	50.4	28.6	53.1	42.6	59.3	57.4	43.9	40.0	63.0	47.9
No (%)	29.1	28.6	29.2	32.4	25.4	26.2	31.8	36.0	29.6	33.3
Unknown (%)	20.5	42.8	17.7	25.0	15.3	16.4	24.3	24.0	7.4	18.8

APP. E34 Departmental Perceptions of the Labor Market for Recent Doctorates--Behavioral Sciences--Percent Distribution (A14)

Fine Field	SURVEY WN	RESPONSE N	Perception of Labor Market: Critical Shortage	Moderate Shortage	Market Balance	Moderate Surplus	Critical Surplus
Psychology	211	158	1.5	9.5	31.2	48.7	9.0
Communication sciences	29	17		44.8	55.2		
Anthropology	69	59		7.2	17.4	62.3	13.0
Sociology	123	82		16.5	28.7	53.0	1.7
Sociology/ anthropology	13	8			41.7	58.3	
Behavioral sciences, NEC	29	19	8.0	44.0	32.0	16.0	
Total behavioral sciences	474	343	1.1	14.9	30.3	47.2	6.5

APP. E35 Departmental Perceptions of the Labor Market for Recent Postdoctorals with Ph.D.'s--Behavioral Sciences--Percent Distribution (A14)

Fine Field	SURVEY WN	RESPONSE N	Perception of Labor Market Critical Shortage	Moderate Shortage	Market Balance	Moderate Surplus	Critical Surplus
Psychology	96	48		4.8	37.1	48.8	9.7
Communication sciences	9	6		81.8	18.2		
Anthropology	29	16		5.0	15.0	60.0	20.0
Sociology	37	22		9.4	37.5	46.9	6.3
Sociology/ anthropology	3	1			100.0		
Behavioral sciences, NEC	5	4		60.0	40.0		
Total behavioral sciences	179	97		14.4	33.3	43.2	9.1

APP. E36 Future Adjustments by Departments to Worsening Job Market--Behavioral Sciences--Percent Responding[a] (A17)

Adjustment to Worsening Job Market	Total	Roose-Andersen Rating		Institution Control		Possession of Training Grant		Department Age		
		≥3.5	Other	Public	Private	Yes	No	Old	Middle	Young
SURVEY WN	474	51	423	317	157	184	290	109	113	162
RESPONSE N	354	39	315	239	115	140	214	83	86	117
Some adjustment	96.6	96.0	96.6	97.5	94.7	96.2	96.8	96.3	94.6	98.1
Provide market information	85.0	72.0	86.5	85.0	84.9	83.7	85.8	83.3	80.4	89.8
Limit enrollment	63.9	64.0	63.9	67.2	57.2	64.7	63.5	62.0	59.8	66.2
Reduce support	10.7	12.0	10.6	9.9	12.5	14.7	8.2	13.0	8.0	10.8
Emphasize masters	21.2	12.0	22.4	22.9	17.8	12.0	27.3	19.4	17.0	23.6
Other	15.7	8.0	16.6	17.5	11.8	17.9	14.2	10.2	16.1	20.4
No adjustment	3.6	4.0	3.6	2.9	5.3	3.8	3.5	3.7	5.4	1.9

[a] Multiple responses lead to sums of greater than 100 percent.

APP. E37 Departmental Perceptions of Change in Postdoctoral Status--Behavioral Sciences--Percent Distribution (A18)

Fine Field	SURVEY NN	RESPONSE N	Change in Time on Postdoctoral Status		If Yes, Time . . .		If Lengthened, Because of . . .			Poor Job Market as % of Total Response
			No	Yes[a]	Shortened	Lengthened	Increased Support	Professional Incentives	Poor Job Market	
TOTAL BEHAVIORAL SCIENCES	179	121	80.5	19.5	3.2	96.8	16.7	13.3	60.0	11.3
Psychology	96	69	73.3	26.7		100.0	21.7	8.7	56.5	15.1
Communication sciences	9	5	66.7	33.3[a]						
Anthropology	29	17	95.5	4.5[a]						
Sociology	37	24	88.2	11.8[a]						
Sociology/anthropology	3	2	100.0							
Behavioral sciences, NEC	5	4	100.0							

[a] Base less than 5; further percentages not shown.

APP. E38 Characteristics of Training Grant Departments--Behavioral Sciences--Percent Distribution

		Roose-Andersen Rating		Institution Control		Institution Type		Department Age		
Training Grant Status	Total	≥3.5	Other	Public	Private	Graduate	Medical	Old	Middle	Young
SURVEY N	474	51	423	317	157	458	16	109	113	162
RESPONSE N	360	40	320	241	119	350	10	84	87	120
Departments with training grants										
Total	40.3	80.4	35.5	38.5	43.9	39.3	68.8	55.0	44.2	27.8
Trainees increased	13.9	21.6	13.0	12.0	17.8	13.3	31.3	17.4	13.3	12.3
Trainees decreased	18.4	47.1	14.9	17.0	21.0	18.1	25.0	28.4	23.0	8.6
No change	7.4	11.8	6.9	8.8	4.5	7.2	12.5	9.2	8.0	6.2
Unknown	0.6		0.7	0.6	0.6	0.7				0.6
Departments without training grants										
Total	59.7	19.6	64.5	61.5	56.1	60.7	31.3	45.0	55.8	72.2
Ratio of departments										
With/without training grants	0.67	4.10	0.55	0.62	0.78	0.65	3.67	1.22	0.79	0.38
Increased/decreased trainees	0.76	0.46	0.87	0.70	0.89	0.73	1.25	0.61	0.58	1.43

APP. E39 Mean Percent Departmental Faculty Applied for/Held NIH/ADAMHA/HRA Research/Training Grants by Training Grant Status of Department, 1976--Behavioral Sciences (A5)

Faculty Applied for/ Held NIH/ADAMHA/HRA Support	All Departments	Departments with Training Grants					Departments without Training Grants
		Total	Trainees Increased	Trainees Decreased	Trainees No Change	Change Unknown	
SURVEY WN	474	191	66	87	35	3	283
RESPONSE N	337	136	45	68	21	2	201
Mean faculty (%)	14.4	23.2	22.1	23.3	26.0	14.0	8.4

APP. E40.1 Change in Primary Source and Type of Support for Full-time Predoctoral Students by Training Grant Status of Department, 1973, 1976--Behavioral Sciences--Number of Students[a]

Source and Type of Support	All Departments		Departments with Training Grants						Departments Without Training Grants	
			Total		Trainees Increased		Trainees Decreased			
	1973	1976	1973	1976	1973	1976	1973	1976	1973	1976
SURVEY N (Departments)	474	474	191	191	66	66	87	87	283	283
RESPONSE N (Departments)	293	293	127	127	39	39	52	52	166	166
All sources										
Total	19,762	21,778	10,252	10,570	2,669	3,037	4,389	4,148	9,510	11,208
Fellow/trainee	5,394	4,797	3,734	3,256	893	847	1,875	1,496	1,660	1,541
Research assistant	2,273	2,382	1,252	1,148	328	374	470	470	1,021	1,234
Teaching assistant	4,495	4,461	2,245	2,337	630	643	874	936	2,250	2,124
Other	7,600	10,138	3,021	3,829	818	1,173	1,170	1,246	4,579	6,309
Total federal										
Total	4,863	4,144	3,523	2,900	881	876	1,624	1,231	1,331	1,244
Fellow/trainee	3,575	2,837	2,666	2,103	645	588	1,303	931	909	734
Research assistant	994	1,023	705	645	169	235	261	237	289	378
Teaching assistant	14	21	6	15	1	9	4	5	8	6
Other	280	263	155	137	66	44	56	58	125	126
Total HEW										
Total	3,218	2,785	2,497	2,110	647	704	1,197	884	721	675
Fellow/trainee	2,630	2,134	2,084	1,661	526	532	1,067	700	546	473
Research assistant	549	606	392	426	106	164	126	132	157	180
Teaching assistant	4	12	1	6	1			5	3	6
Other	35	33	20	17	14	8	4	7	15	16
Total nonfederal										
Total	14,899	17,634	6,720	7,670	1,788	2,161	2,765	2,917	8,179	9,964
Fellow/trainee	1,819	1,960	1,068	1,153	248	259	572	565	751	807
Research assistant	1,279	1,359	547	503	159	139	209	233	732	856
Teaching assistant	4,481	4,440	2,239	2,322	629	634	870	931	2,242	2,118
Other	7,320	9,875	2,866	3,692	752	1,129	1,114	1,188	4,454	6,183
Institution/state										
Total	7,553	7,925	3,830	4,150	1,014	1,055	1,655	1,740	3,723	3,775
Fellow/trainee	1,249	1,327	723	790	136	163	430	390	526	537
Research assistant	1,117	1,218	447	432	130	123	169	187	670	786
Teaching assistant	4,458	4,439	2,238	2,322	629	634	870	931	2,220	2,117
Other	729	941	422	606	119	135	186	232	307	335
Self	5,961	8,256	2,061	2,697	548	838	742	781	3,900	5,559

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[a] Support data from NSF (1973-76). Data are based on those departments reporting both 1973 and 1976 full-time students. Numbers therefore understate actual student population.

APP. E40.2 Change in Primary Source and Type of Support for Full-time Predoctoral Students by Training Grant Status of Department, 1973-76--Behavioral Sciences--Percent Change[a]

Source and Type of Support	All Departments	Departments with Training Grants: Total	Departments with Training Grants: Trainees Increased	Departments with Training Grants: Trainees Decreased	Departments without Training Grants
SURVEY WN (Departments)	474	191	66	87	283
RESPONSE N (Departments)	293	127	39	52	166
All sources					
Total	10.2	3.1	13.8	-5.5	17.9
Fellow/trainee	-11.1	-12.8	-5.2	-20.2	-7.2
Research assistant	4.8	-8.3	14.0	0.0	20.9
Teaching assistant	-0.8	4.1	2.1	7.1	-5.6
Other	33.4	26.7	43.4	6.5	37.8
Total federal					
Total	-14.8	-18.0	-0.6	-24.2	-6.5
Fellow/trainee	-20.6	-21.1	-8.2	-28.5	-19.3
Research assistant	2.9	-8.5	39.1	-9.2	30.8
Teaching assistant					
Other	-6.1	-11.6	33.3	3.6	0.8
Total HEW					
Total	-13.5	-15.5	8.8	-29.5	-6.4
Fellow/trainee	-18.9	-20.3	1.1	-34.4	-13.4
Research assistant	10.4	8.7	54.7	4.8	14.6
Teaching assistant					
Other					
Total nonfederal					
Total	18.4	14.1	20.9	5.5	21.8
Fellow/trainee	7.8	8.0	4.4	-1.2	7.5
Research assistant	6.3	-8.0	12.6	11.5	16.9
Teaching assistant	-0.9	3.7	0.8	7.0	5.5
Other	34.9	28.8	50.1	6.6	38.8
Institution/state					
Total	4.9	8.4	4.0	5.1	1.4
Fellow/trainee	6.2	9.3	19.9	-9.3	2.1
Research assistant	9.0	-3.4	-5.4	10.7	17.3
Teaching assistant	-0.4	3.8	0.8	7.0	-4.6
Other	29.1	43.6	13.4	24.7	9.1
Self	38.5	30.9	52.9	5.3	42.5

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[a] Support data from NSF (1973-76). Data are based on those departments reporting both 1973 and 1976 full-time graduate students.

APP. B40.3 Change in Primary Source and Type of Support for Full-time Predoctoral Students by Training Grant Status of Department, 1973, 1976--Behavioral Sciences--Percent Distribution[a]

Source and Type of Support	All Departments		Departments with Training Grants: Total		Trainees Increased		Trainees Decreased		Departments without Training Grants	
	1973	1976	1973	1976	1973	1976	1973	1976	1973	1976
Survey NN (Departments)	474	474	191	191	66	66	87	87	283	283
Response N (Departments)	293	293	127	127	39	39	52	52	166	166
All sources										
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Fellow/trainee	27.3	27.3	36.4	30.8	33.5	27.9	42.7	36.1	17.5	13.7
Research assistant	11.5	10.9	12.2	10.9	12.3	12.3	10.7	11.3	10.7	11.0
Teaching assistant	22.7	20.5	21.9	22.1	23.6	21.2	19.9	22.6	23.7	19.0
Other	38.5	46.6	29.5	36.2	30.6	38.6	26.7	30.0	48.1	56.3
Total federal										
Total	24.6	19.0	34.5	27.4	33.0	28.8	37.0	29.7	14.0	11.1
Fellow/trainee	18.1	13.0	26.0	19.9	24.2	19.4	29.7	22.4	9.6	6.5
Research/assistant	5.0	4.7	6.9	6.1	6.3	7.7	5.9	5.7	3.0	3.4
Teaching assistant	0.1	0.1	0.1	0.1		0.3	0.1	0.1	0.1	0.1
Other	1.4	1.2	1.5	1.3	2.5	1.4	1.3	1.4	1.3	1.1
HEW										
Total	16.3	12.8	24.4	20.0	24.2	23.2	27.3	20.3	7.6	6.0
Fellow/trainee	13.3	9.8	20.3	15.7	19.7	17.5	24.3	16.9	5.7	4.2
Research assistant	2.8	2.8	3.8	4.0	4.0	5.4	2.9	3.2	1.7	1.6
Teaching assistant		0.1		0.1				0.1		0.1
Other	0.2	0.2	0.2	0.2	0.5	0.3	0.1	0.2	0.2	0.1
Total nonfederal										
Total	75.4	81.0	65.5	72.6	67.0	71.2	63.0	70.3	86.0	88.9
Fellow/trainees	9.2	9.0	10.4	10.9	9.3	8.5	13.0	13.6	7.9	7.2
Research assistant	6.5	6.2	5.3	4.8	6.0	4.6	4.8	5.6	7.7	7.6
Teaching assistant	22.7	20.4	21.8	22.0	23.6	20.8	19.8	22.4	23.6	18.9
Other	37.0	45.3	28.0	34.9	28.2	37.2	25.4	28.6	46.8	55.2
Institution/state										
Total	38.2	36.4	37.4	29.3	38.0	34.7	27.7	41.9	39.1	33.7
Fellow/trainees	6.3	6.1	7.1	7.5	5.1	5.4	9.8	9.4	5.5	4.8
Research assistant	5.7	5.8	4.4	4.1	4.9	4.1	3.9	4.5	7.0	7.0
Teaching assistant	22.6	20.4	21.8	22.0	23.6	20.9	19.8	22.4	23.3	18.9
Other	3.7	4.3	4.1	5.7	4.5	4.4	4.2	5.6	3.2	3.0
Self	30.2	37.9	20.1	25.5	20.5	27.6	16.9	18.8	41.0	49.6

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[a] Support data from NSF (1973-76). Data are based on those departments reporting both 1973 and 1976 full-time graduate students.

APP. E41 Change in Primary Source and Type of Support for Full-time Predoctoral Students for Departments Losing NIH/ADAMHA/HRA Traineeships by Trend in Enrollment, 1973-76--Behavioral Sciences[a]

Source and Type of Support	Departments Where Trainees Declined, Enrollments Declined					Departments Where Trainees Declined, Enrollments Increased				
	Number of Students		Percent Distribution		Percent Change	Number of Students		Percent Distribution		Percent Change
	1973	1976	1973	1976	1973-76	1973	1976	1973	1976	1973-76
Response N (Departments)	33	33	33	33	33	19	19	19	19	19
ALL SOURCES										
Total	3,174	2,886	100.0	100.0	-9.1	1,215	1,262	100.0	100.0	3.9
Fellow/Trainee	1,240	1,043	39.1	36.1	-15.9	635	453	52.3	35.9	-28.7
Research assistant	352	316	11.1	10.9	-10.2	118	154	9.7	12.2	30.5
Teaching assistant	686	704	21.6	24.4	2.6	188	232	15.5	18.4	23.4
Other	896	823	28.2	28.5	-8.1	274	423	22.6	33.5	54.4
Total federal										
Total	1,068	832	33.6	28.8	-22.1	556	399	45.8	31.6	-28.2
Fellow/trainee	842	638	26.5	22.1	-24.2	461	293	37.9	23.2	-27.4
Research assistant	187	156	5.9	5.4	-16.6	74	81	6.1	6.4	9.5
Teaching assistant	4		0.1				5		0.4	
Other	35	38	1.1	1.3	8.6	21	20	1.7	1.6	-4.8
HEW										
Total	790	589	24.9	20.4	-25.4	407	255	33.5	20.2	-37.3
Fellow/trainee	710	503	22.4	17.4	-29.2	357	197	29.4	15.6	-44.8
Research assistant	76	81	2.4	2.8	6.6	50	51	4.1	4.0	2.0
Teaching assistant							5		0.4	
Other	4	5	0.1	0.2	25.0		2		0.2	
Total nonfederal										
Total	2,106	2,054	66.4	71.2	-2.5	659	863	54.2	68.4	31.9
Fellow/trainee	398	405	12.5	14.0	1.8	174	160	14.3	12.7	-8.0
Research assistant	165	160	5.2	5.5	-3.0	44	73	3.6	5.8	65.9
Teaching assistant	682	704	21.5	24.4	3.2	188	227	15.5	18.0	20.7
Other	861	785	27.1	27.2	-8.8	253	403	20.8	31.9	59.3
Institution/state										
Total	1,294	1,285	40.8	44.5	-0.7	361	455	29.7	36.1	26.0
Fellow/trainee	325	278	10.2	9.6	-14.5	105	112	8.6	8.9	6.7
Research assistant	134	126	4.2	4.4	-6.0	35	61	2.9	4.8	74.3
Teaching assistant	682	704	21.5	24.4	3.2	188	227	15.5	18.0	20.7
Other	153	177	4.8	6.1	15.7	33	55	2.7	4.4	66.7
Self	547	486	17.2	16.8	-11.2	195	295	16.0	23.4	51.3

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[a] Support data from NSF (1973-76). Data are based on those departments reporting both 1973 and 1976 full-time students. Numbers therefore understate actual student population.

APP. E42 Primary Reason Given by Departments for Enrollment Decrease When Trainees Decreased--Behavioral Sciences--Percent Distribution (C5)

Trainees Decreased--Reason for Enrollment Decrease		Roose-Andersen Rating		Institution Control		Department Age		
	Total	≥3.5	Other	Public	Private	Old	Middle	Young
SURVEY WN	55	19	36	35	20	23	17	8
RESPONSE N	30	8	22	18	12	10	13	4
No stipend support	62.2	54.5	65.4	54.5	73.3	50.0	78.6	50.0
Limit on self-supported students	8.1	18.2	3.8	9.1	6.7	16.7		16.7
Poor job market	10.8	18.2	7.7	9.1	13.3	16.7		
Fewer quality applicants	5.4		7.7	9.1		8.3		7.1
Other	13.5	9.1	15.4	18.2	6.7	8.3	14.3	33.3

APP. E43 Primary Reason Given by Departments for Enrollment Increase When Trainees Decreased--Behavioral Sciences--Percent Distribution (C6)

Trainees Decreased--Reason for Enrollment Increase	Total	Roose-Andersen Rating		Institution Control		Department Age		
		≥3.5	Other	Public	Private	Old	Middle	Young
SURVEY WN	43	5	38	24	19	15	12	7
RESPONSE N	27	2[a]	25	15	12	10	7	4[a]
Alternative fellowships/ traineeships	13.5		11.8	15.8	11.1	25.0	15.4	
More research grants	16.2		17.6	10.5	22.2	15.4		
More self-supported students	35.1		38.2	31.6	38.9	38.5	60.0	
More quality applicants	13.5		14.7	21.1	5.6	7.7		
Need higher degree	5.4		5.9		11.1	15.4		
Manpower shortage								
Other	10.8		11.8	10.5	11.1	7.7		

[a] Base N less than 5; no percentages shown

APP. E44 Impact of Lost Institutional Support from Training Grants on Departmental Program Activities, by Current and Potential Impact--Behavioral Sciences--Percent Distribution (C9, C10)

Program Activity	Experienced Impact, 1972-75				Potential Impact of Elimination			
	Response N	Little or None	Moderate Cutback	Severe Curtailment	Response N	Little or None	Moderate Cutback	Severe Curtailment
Teaching courses	69	74.0	21.9	4.2	104	52.4	30.8	16.8
Special seminars	72	53.5	33.3	13.1	106	41.8	31.5	26.7
Interdisciplinary training	69	60.4	28.1	11.5	101	44.7	22.7	32.6
Student research support	77	29.8	41.3	28.8	111	30.7	32.0	38.7
Academic staff	72	46.4	39.2	14.4	107	36.7	36.1	27.2
Program support staff	74	28.8	40.6	35.6	106	28.6	27.2	44.2
Travel to professional meetings	74	20.0	38.0	42.0	107	35.9	29.0	35.2
Other	20	23.3	33.3	43.3	25	32.4	26.5	41.2

APP. E45 Departmental Ranking of Quality of Predoctoral NIH/ADAMHA/HRA Trainees in Their Department--Behavioral Sciences--Percent Distribution (B2)

Quality of Predoctoral Trainees	Total	Roose-Andersen Rating		Institution Control		Department Age		
		>3.5	Other	Public	Private	Old	Middle	Young
SURVEY WN	176	36	140	111	65	57	49	39
RESPONSE N	130	29	101	82	48	44	37	25
Better than average	58.0	50.0	60.1	58.7	56.9	63.2	61.2	51.4
No difference	41.4	50.0	39.1	40.4	43.1	36.8	36.7	48.6
Below average	0.6		0.7	0.9			2.0	

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Approval Expires May 30, 1977

SURVEY OF BIOMEDICAL AND BEHAVIORAL SCIENCE DEPARTMENTS

COMMITTEE ON A STUDY OF NATIONAL NEEDS FOR BIOMEDICAL AND BEHAVIORAL RESEARCH PERSONNEL

NATIONAL RESEARCH COUNCIL

PLEASE RETURN BY FEBRUARY 7, 1977.

(Name of Respondent) ____________________

(Department) ____________________

(School or College within University) ____________________

(Telephone No.) ____________________

THE ACCOMPANYING LETTER requests your assistance in this survey of biomedical and behavioral science departments.

PLEASE READ the instructions carefully and answer by printing your reply or checking the appropriate box.

PLEASE COMMENT on any questions which you think require fuller explanation.

PLEASE RETURN the completed form in the enclosed envelope to the Commission on Human Resources, JH 638, National Research Council, 2101 Constitution Avenue, N.W., Washington, D.C. 20418, no later than February 7, 1977.

If you have any questions about the survey, please call collect Robert G. Snyder at (202) 389-6656.

GENERAL INSTRUCTIONS

Graduate students and postdoctorals should be reported in only one department. An individual in an interdisciplinary program should be reported only in the department in which he/she is primarily enrolled. Please coordinate your reply with other departments if necessary.

Questions requesting data on the support of students should be reported only by the PRIMARY (largest single) source of support. Each individual should be counted only once, by his/her major source of support. Data are requested only for students who are enrolled FULL-TIME. Full-time status may include any combination of research, teaching, and study activities that your institution defines as constituting full-time.

Information relating to FACULTY is requested for both individuals and full-time equivalents (FTE). Include as faculty those with regular faculty appointments AND those with research appointments EXCLUDING POSTDOCTORALS (see definition below). Use your own institution's definition of what constitutes "full-time."

DEPARTMENTS OF PSYCHOLOGY: Please note special instructions throughout this questionnaire AND complete and return the BEIGE INSERT SHEET along with the blue questionnaire.

DEFINITIONS

TRAINEES–See definition under TYPES OF SUPPORT, TRAINING GRANTS.

TRAINING LEVELS:

PREDOCTORALS–graduate students enrolled in a degree program, usually a discipline, leading to a Ph.D. or equivalent. EXCLUDE MEDICAL STUDENTS working for professional degrees, but INCLUDE students in dual degree programs (e.g., M.D.-Ph.D.).

POSTDOCTORALS–includes only those individuals with science or engineering doctorates or those with professional doctorates (M.D., D.D.S., D.V.M., etc.) who, under TEMPORARY APPOINTMENTS, devote full-time to research activities or study in the department, usually for a SPECIFIC TIME PERIOD, and who carry NO ACADEMIC RANK. EXCLUDE HOSPITAL HOUSE STAFF unless their primary objective is RESEARCH TRAINING under a senior mentor.

- POST-PH.D.–specialized research training taking place after receipt of a Ph.D. or equivalent degree.
- POST-M.D.–research training taking place after receipt of a professional doctorate (M.D., D.D.S., D.V.M., etc.).

SOURCES OF SUPPORT:

NIH The National Institutes of Health.

ADAMHA–The Alcohol, Drug Abuse, and Mental Health Administration. Since this agency was not extant as a single entity in 1972, make 1972 and 1976 years comparable by aggregating the three component institutes: Alcohol Abuse and Alcoholism, Drug Abuse, and Mental Health.

HRA–Health Resources Administration.

INSTITUTION/STATE–refers to sources of support within the academic institution itself and those from state and local governments.

SELF- individuals receiving their primary source of support from personal, family, and loan sources.

TYPES OF SUPPORT:

TRAINING GRANTS- grants awarded by the federal government to institutions for individual departments or a consortium of departments for training in a specific field. Grants provide for trainee costs (largely stipends) and INSTITUTIONAL SUPPORT (including expenses for salaries, special seminars, courses, equipment, and supplies). Individuals supported on such awards are TRAINEES.

FELLOWSHIPS–awards made directly to the individual, consisting of a stipend and an institutional subvention in lieu of tuition. Individuals supported on such awards are FELLOWS.

RESEARCH ASSISTANTSHIPS–predoctoral support provided for work performed on a research grant or contract. (The postdoctoral equivalent is the research associateship.)

TEACHING ASSISTANTSHIPS–predoctoral support provided for work performed as part of teaching programs.

PART A: DEPARTMENT AND JOB MARKET INFORMATION

INSTRUCTIONS: All departments complete Part A.

A1. In what year did your department award its first doctorate? 19____ (9-10)

A2. What has been the number of predoctorals, postdoctorals, and faculty for the last three years and what is your estimate of their levels for Fall 1977 and Fall 1981? (Note: any data provided below comes from the NSF Survey of Graduate Science Student Support and Postdoctorals, Fall 1974 and Fall 1976. Please correct as necessary.)

	Fall				
	1974	*1975*	*1976*	*(est.) 1977*	*(est.) 1981*
1. Full-time predoctoral enrollments	____ (11-13)	____ (14-16)	____ (17-19)	____ (20-22)	____ (23-25)
2. Full-time postdoctorals	____ (26-27)	____ (28-29)	____ (30-31)	____ (32-33)	____ (34-35)
3. Total faculty	____ (36-37)	____ (38-39)	____ (40-41)	____ (42-43)	____ (44-45)
4. Full-time equivalent (FTE) faculty	____ (46-47)	____ (48-49)	____ (50-51)	____ (52-53)	____ (54-55)

A3. As of Fall 1976, how many of your full-time predoctoral students (as shown in Question A2) were in terminal masters degree programs? ________ (56-58)

A4. If any net changes occurred between 1974 and 1976 (as shown in A2) in either the number of predoctorals or postdoctorals, please identify the primary factors that contributed to these net changes. Rank order the top 3 factors, using "1" as the most important, "2" as the next most important, and "3" as the third most important.

Changes in	*Predoctorals (rank 3)*	*Postdoctorals (rank 3)*
1. Federal fellowship/traineeship support	____	____
2. Federal research grant/contract support	____	____
3. Institution/state support	____	____
4. Number of applicants	____	____
5. Quality of applicants	____	____
6. Demand for graduates in your field	____	____
7. Competition for places in medical/ professional schools	____	____
8. Faculty size	____	____
9. Other, specify: ________	____	____
	(59-61)	(62-64)

A5. As a measure of the health-related research effort in your department, how many of your total faculty (as shown in Question A2, line 3) APPLIED FOR OR HELD NIH, ADAMHA, or HRA awards for research or research training (e.g., training grants or research grants/contracts) in academic years Fall 1975 and Fall 1976? (Note: for each year, count each individual only once; include only principal investigators.)

________ Fall 1975 (65-66)
________ Fall 1976 (67-68)

A6. How many faculty vacancies will be created through academic year 1981-82 due to retirements?

Total faculty retirements________ (69-70) FTE faculty retirements________ (71-72)

A7. For ANY of the academic years 1974-75 through 1976-77, has your department been either a SOLE RECIPIENT of an NIH/ADAMHA/HRA training grant or PARTICIPATED in an interdepartmental training grant from any of these agencies? (Include both training grants under the old training grant program and the new NRSAA awards.)

1 ☐ Yes 2 ☐ No (73)

A8. a) Using the combined verbal and quantitative GRE aptitude tests (e.g., 600 + 700 = 1300), what was the AVERAGE OF THE COMBINED test scores for those admitted to the first year of graduate training in your department for the years Fall 1974 through Fall 1976?

Fall 1974 Average________ (8-11) Fall 1975 Average________ (12-15) Fall 1976 Average________ (16-19)

b) Do you require GRE test scores for admission? 1 ☐ Yes 2 ☐ No (20)

A9. Does your department LIMIT the number of full-time predoctoral students it ADMITS based on what it foresees as the future job market?

1 ☐ Yes 2 ☐ No (21)

A10. a) Does your department LIMIT the number of full-time predoctoral students it ADMITS based on what it foresees as the support that will be available to students throughout their graduate student years?

1 ☐ Yes 2 ☐ No (22)

b) If YES, indicate the PRIMARY source considered in your department's planning.

Sources	*Primary (check only one)*
1. Federal	☐
2. Institution/state	☐
3. Other, specify: ________	☐ (23)

A11. a) Subject to satisfactory academic performance of the student, does your department provide reasonable assurance of full stipend or salary and remission of full tuition-fees to ANY of your predoctoral students? (Note: Use your own institution's definition of what constitutes "full tuition fees" and "full stipend or salary.")

1 ☐ Yes 2 ☐ No (24)

b) If YES, then over the last three years approximately what percent of your full-time students has been assured of such support?

______ percent (25-26)

c) If YES, then for approximately how many years is such support customarily provided for a full-time student?

______ years (27)

A12. Based on experience, how many full-time years of study does the AVERAGE predoctoral student take to complete his/her doctorate in your department?

______ years (28)

A13. a) Does your department have a policy restricting full-time predoctoral students from engaging in regular nonacademic employment?

1 ☐ Yes 2 ☐ No (29)

b) If YES, would your department permit such employment if overall federal and institution/state sources were sharply cut back?

1 ☐ Yes 2 ☐ No (30)

A14. From your placement experience during the last three years, how would you characterize the state of the job market for the fields into which your recent doctorate recipients and postdoctorals enter? (Exclude postdoctoral appointments in assessing the job market for recent doctorate recipients.) (NOTE TO DEPARTMENTS OF PSYCHOLOGY: Please respond only with respect to the placement of personnel who are NOT IN SERVICE-ORIENTED fields.)

	Recent Doctorate Recipients (check only one)	*Postdoctorals*	
		Post-Ph.D. (check only one)	*Post-M.D. (check only one)*
1. CRITICAL SHORTAGE: demand far exceeds supply; many jobs going unfilled	☐	☐	☐
2. MODERATE SHORTAGE: demand somewhat exceeds supply	☐	☐	☐
3. MARKET BALANCE: supply and demand in equilibrium	☐	☐	☐
4. MODERATE SURPLUS: supply somewhat exceeds demand	☐	☐	☐
5. CRITICAL SURPLUS: supply greatly exceeds demand; many job seekers out of work or underemployed (i.e., not fully utilizing their skills)	☐ (31)	☐ (32)	☐ (33)

A15. a) Does your department make an ORGANIZED effort to provide APPLICANTS for predoctoral study information concerning the current and/or projected state of the labor market in your field?

1 ☐ Yes 2 ☐ No (34)

b) If YES, check all that apply:

1. ☐ Provide national data about the labor market
2. ☐ Provide information about positions recent graduates have taken
3. ☐ Counsel individuals about career options
4. ☐ Other, specify: ________ (35-38)

A16. a) Do you feel that more systematic and up-to-date information concerning the state of the labor market in your field is needed?

1 ☐ Yes 2 ☐ No (39)

b) If YES, and if such information were available, would you distribute it to current and prospective graduate students?

1 ☐ Yes 2 ☐ No (40)

A17. If a worsening job market situation develops, what action would you be prepared to take regarding your department's predoctoral enrollment?

Check all that apply:

1. ☐ Provide market information to prospective students
2. ☐ Limit enrollment–tighten admissions standards
3. ☐ Reduce financial support
4. ☐ De-emphasize doctoral output and encourage masters programs
5. ☐ Other, specify: ________
6. ☐ No action

(41-46)

A18. a) Has there been any change in recent years in the AVERAGE length of time that persons in your department have been on POSTDOCTORAL status (i.e., including all postdoctoral appointments the individual might have taken immediately prior to entering his/her current position)?

1 ☐ Yes   2 ☐ No   (47)

b) If YES, has the average time   1 ☐ lengthened   2 ☐ shortened   (48)

c) If the average time has LENGTHENED, what is the PRIMARY factor to which you would attribute this phenomenon?

Check ONE:

1. ☐ Increased postdoctoral support available
2. ☐ Professional incentives for more advanced training/specialization
3. ☐ Worsening job market
4. ☐ Other, specify: ____________________ (49)

A19. From your experience, have the new Ph.D.'s recently appointed to your faculty been adequately prepared for teaching responsibilities?

1 ☐ Yes   2 ☐ No   (50)

PART B: NIH/ADAMHA/HRA TRAINING GRANTS AND FELLOWSHIPS

INSTRUCTIONS: If your department CURRENTLY has any NIH/ADAMHA/HRA fellowships or training grants, please complete this section. If not, then proceed to PART C.
(NOTE TO DEPARTMENTS OF PSYCHOLOGY: Complete this section with respect to RESEARCH TRAINING ONLY; exclude information regarding clinical training.)

B1. As of Fall 1976, how many of your full-time predoctorals and postdoctorals were supported by NIH, ADAMHA, and HRA fellowships and traineeships?

	Predoctoral		*Postdoctoral*	
Agency	*Fellows*	*Trainees*	*Fellows*	*Trainees*
1. NIH	______ (51-52)	______ (53-54)	______ (55-56)	______ (57-58)
2. ADAMHA	______ (59-60)	______ (61-62)	______ (63-64)	______ (65-66)
3. HRA	______ (67-68)	______ (69-70)	______ (71-72)	______ (73-74)

B2. In terms of the QUALITY of the PREDOCTORAL students currently in your department, where would you rank NIH/ADAMHA/HRA trainees and fellows?

	Better than Average	*Below Average*	*No Difference*	
1. NIH/ADAMHA/HRA predoctoral TRAINEES	1 ☐	2 ☐	3 ☐	(75)
2. NIH/ADAMHA/HRA predoctoral FELLOWS	1 ☐	2 ☐	3 ☐	(76)

B3. If your department were to lose its NIH/ADAMHA/HRA training grant/fellowship support in the near future, would your department seek alternative REPLACEMENT support from the federal government?

1 ☐ Yes   2 ☐ No   3 ☐ Do not know   (77)

B4. If your department were to lose its NIH/ADAMHA/HRA training grant/fellowship support in the near future, what actions would you anticipate your department taking if alternative replacement support were NOT available?
Check all that apply:

1. ☐ Permit a greater percentage of predoctoral students to be self-supporting; would this include engaging in outside employment? 1 ☐ Yes   2 ☐ No   (8)
2. ☐ Reduce enrollment
3. ☐ Spread remaining discretionary federal, state, and institution funds more widely
4. ☐ Other, specify: ____________________ (9-13)
5. ☐ No action

PART C: NIH/ADAMHA/HRA TRAINING GRANTS

INSTRUCTIONS: Complete PART C ONLY if your department has received SOME NIH/ADAMHA/HRA TRAINING GRANT support at ANY time during the period from Fall 1972 to the present. If you have not, thank you for completing the questionnaire.
(NOTE TO DEPARTMENTS OF PSYCHOLOGY: Complete this section with respect to RESEARCH TRAINING GRANTS ONLY; exclude information regarding grants for clinical training.)

C1. For the years Fall 1972 and Fall 1976, please provide the following information for full-time predoctoral students and postdoctorals in your department. (Note: any data provided below comes from the NSF Survey of Graduate Science Student Support and Postdoctorals, Fall 1972 and 1976. Please correct as necessary.)

	Fall 1972		*Fall 1976*	
	Predoc.	*Postdoc.*	*Predoc.*	*Postdoc.*
1. Full-time predoctoral enrollments/postdoctorals	____ (14-16)	____ (17-19)	____ (20-22)	____ (23-25)
2. Of these, how many were full-time trainees	____ (26-27)	____ (28-29)	____ (30-31)	____ (32-33)

C2. Please provide the training grant numbers for each grant which was active in either Fall 1972 or Fall 1976. (Include both training grants for which your department was the sole recipient AND those interdepartmental grants in which your department was a participant.

		Check If Grant Active in Fall	
	Training grant awards	*1972*	*1976*
	1. Grant No. ____________ (34-40)	☐ (41)	☐ (42)
(If applicable)	2. Grant No. ____________ (43-49)	☐ (50)	☐ (51)
"	3. Grant No. ____________ (52-58)	☐ (59)	☐ (60)
"	4. Grant No. ____________ (61-67)	☐ (68)	☐ (69)
"	5. Grant No. ____________ (70-76)	☐ (77)	☐ (78)

C3. From Fall 1972 to Fall 1976, has the amount of your training grant DOLLARS (including those received from participation in interdepartmental grants) increased or decreased?

1 ☐ Increased   2 ☐ Decreased   3 ☐ No Change   (79)

C4. If the number of either your predoctoral or postdoctoral TRAINEES DECLINED from 1972 to 1975 (as shown in Question C1, line 2), what attempts were made to find alternative sources of support for your continuing predoctoral students and postdoctorals?

	Predoctoral			*Postdoctoral*		
Possible Alternative Sources	*Successful**	*Unsuccessful*	*No Attempt*	*Successful**	*Unsuccessful*	*No Attempt*
1. FEDERAL GOVERNMENT:						
a. research grants/contracts (new or existing)	1 ☐	2 ☐	3 ☐ (9)	1 ☐	2 ☐	3 ☐ (10)
b. other fellowships/traineeships	1 ☐	2 ☐	3 ☐ (11)	1 ☐	2 ☐	3 ☐ (12)
2. INSTITUTION/STATE:						
a. research grants/contracts (new or existing)	1 ☐	2 ☐	3 ☐ (13)	1 ☐	2 ☐	3 ☐ (14)
b. fellowships/traineeships	1 ☐	2 ☐	3 ☐ (15)	1 ☐	2 ☐	3 ☐ (16)
c. teaching assistantships	1 ☐	2 ☐	3 ☐ (17)	1 ☐	2 ☐	3 ☐ (18)
3. PRIVATE FOUNDATIONS	1 ☐	2 ☐	3 ☐ (19)	1 ☐	2 ☐	3 ☐ (20)
4. INDUSTRY	1 ☐	2 ☐	3 ☐ (21)	1 ☐	2 ☐	3 ☐ (22)
5. Other, specify: ____________	1 ☐	2 ☐	3 ☐ (23)	1 ☐	2 ☐	3 ☐ (24)

*"Successful" may include those sources which only partially redressed lost support.

C5. If the number of BOTH your PREDOCTORAL TRAINEES and ENROLLMENTS DECLINED between Fall 1972 and Fall 1975 (as shown in Question C1), what were the primary and secondary causes of this decline in enrollments?

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	Primary (check only one)	*Secondary (check all relevant)*
1. Nonavailability of alternative sources of stipend support	1 ☐	2 ☐
2. Departmental decisions prohibiting or limiting number of self-supported students	1 ☐	2 ☐
3. Poor job market	1 ☐	2 ☐
4. Lack of qualified applicants	1 ☐	2 ☐
5. Other, specify: ____________	1 ☐	2 ☐
	(25)	(26-29)

C6. If (as shown in Question C1) the number of your PREDOCTORAL TRAINEES supported on NIH/ADAMA/HRA training grants DECLINED between Fall 1972 and Fall 1975 while your PREDOCTORAL ENROLLMENTS remained LEVEL or INCREASED, what were the primary and secondary causes of this trend in enrollments?

	Primary (check only one)	*Secondary (check all relevant)*
1. Availability of alternative fellowships and (non-NIH/ADAMHA/HRA) traineeships	1 ☐	2 ☐
2. Increase in research grant/contract support	1 ☐	2 ☐
3. More students who were self-supporting	1 ☐	2 ☐
4. Increase in number of qualified applicants	1 ☐	2 ☐
5. Labor market pressure for higher degree attainment	1 ☐	2 ☐
6. Manpower shortages in employment areas fed by your training fields	1 ☐	2 ☐
7. Other, specify: ____________	1 ☐	2 ☐
	(30)	(31-36)

C7. As of Fall 1976, what percent of your total faculty salaries was derived from

a) NIH/ADAMHA/HRA training grants? ______ percent (37-38)

b) NIH/ADAMHA/HRA research grants/contracts: ______ percent (39-40)

C8. In the event that training grants were eliminated and you were unable to compensate for the loss of associated faculty salary support, how many of your department's full-time equivalent faculty positions would be lost (use fractions if necessary)? ____________ (41-44)

Answer the following questions only if you have received training grant support in BOTH academic years 1972-73 and 1975-76.

C9. If you experienced a significant decline in the overall level of the INSTITUTIONAL support which your department received from training grants between 1972-73 to 1975-76, what was the impact of this decline?

C10. What would have been the impact on your department if NO training grant support had been available in 1975-76?

	C9			C10		
	Little or None	*Moderate Cutback*	*Severe Curtailment*	*Little or None*	*Moderate Cutback*	*Severe Curtailment*
1. Teaching courses	1 ☐	2 ☐	3 ☐ (45)	1 ☐	2 ☐	3 ☐ (46)
2. Teaching special seminars	1 ☐	2 ☐	3 ☐ (47)	1 ☐	2 ☐	3 ☐ (48)
3. Interdisciplinary training	1 ☐	2 ☐	3 ☐ (49)	1 ☐	2 ☐	3 ☐ (50)
4. Auxiliary research support: lab equipment/supplies, computer time, library materials, etc.	1 ☐	2 ☐	3 ☐ (51)	1 ☐	2 ☐	3 ☐ (52)
5. Academic staff support	1 ☐	2 ☐	3 ☐ (53)	1 ☐	2 ☐	3 ☐ (54)
6. Non-academic staff support	1 ☐	2 ☐	3 ☐ (55)	1 ☐	2 ☐	3 ☐ (56)
7. Travel	1 ☐	2 ☐	3 ☐ (57)	1 ☐	2 ☐	3 ☐ (58)
8. Other, specify: ____________	1 ☐	2 ☐	3 ☐ (59)	1 ☐	2 ☐	3 ☐ (60)

THANK YOU FOR YOUR COOPERATION.

FOR DEPARTMENTS OF PSYCHOLOGY ONLY

PLEASE RETURN WITH QUESTIONNAIRE

Because this study is directed toward research training, we must request additional information to distinguish RESEARCH from CLINICAL training. Please provide the following information for CLINICAL TRAINING in your department.

1. What has been the number of full-time predoctorals, postdoctorals, and faculty whose primary area of academic interest is CLINICAL PSYCHOLOGY? (Subset of Question A2.)

	Fall				
	1974	*1975*	*1976*	*(est.)* *1977*	*(est.)* *1981*
a. Full-time CLINICAL PSYCHOLOGY predoctoral enrollments	_____(8-10)	_____(11-13)	_____(14-16)	_____(17-19)	_____(20-22)
b. Full-time CLINICAL PSYCHOLOGY postdoctorals	_____(23-24)	_____(25-26)	_____(27-28)	_____(29-30)	_____(31-32)
c. Total CLINICAL PSYCHOLOGY faculty	_____(33-34)	_____(35-36)	_____(37-38)	_____(39-40)	_____(41-42)
d. Full-time equivalent (FTE) CLINICAL PSYCHOLOGY faculty	_____(43-44)	_____(45-46)	_____(47-48)	_____(49-50)	_____(51-52)

2. As of Fall, 1976, how many of your full-time predoctoral students were in terminal masters degree programs in CLINICAL PSYCHOLOGY? (Subset of Question A2.)______(53-55)

3. How many of your full-time predoctoral students and postdoctorals were supported on NIH/ADAMHA/HRA grants for CLINICAL TRAINING? (Subset of Question C1, line 2.)

	Fall 1972		*Fall 1976*	
	Predoc.	*Postdoc.*	*Predoc.*	*Postdoc.*
Full-time trainees	_____(56-57)	_____(58-59)	_____(60-61)	_____(62-63)

APPENDIX F

MARKET DATA RELATING TO THE ANALYSIS OF ACADEMIC DEMAND FOR BIOMEDICAL AND BEHAVIORAL PH.D.'S AND CLINICAL FACULTY

APP. F1 Biomedical Science Baccalaureate Degrees and Undergraduate Enrollment

	B.A. Degrees (excluding first professional)			Total Undergraduate Degree Credit Enrollment (thousands)	
Fiscal Year	Total B.A.'s	Biomed. Sci.[a]	Ratio of Biomed. Sci. to Total B.A.'s	Incl. First Professional[b]	Excl. First Professional[c]
1960				3,402	3,334
1961	365,337	15,588	0.0427	3,610	3,538
1962	382,822	16,424	0.0429	3,891	3,813
1963	410,421	18,704	0.0456	4,207	4,123
1964	460,467	22,207	0.0482	4,529	4,438
1965	492,984	24,612	0.0499	4,342	4,255
1966	524,117	26,336	0.0502	4,829	4,732
1967	562,369	28,157	0.0501	5,161	5,058
1968	636,863	31,221	0.0490	5,557	5,437
1969	734,002	34,816	0.0474	6,043	5,905
1970	798,070	36,868	0.0462	6,528	6,376
1971	846,110	40,000	0.0473	6,889	6,719
1972	894,110	42,000	0.0470	7,104	6,913
1973	930,272	45,000	0.0484	7,199	6,998
1974	954,376	47,434	0.0497	7,395	7,187
1975	931,663	50,493	0.0542	7,833	7,610
1976	934,443	52,642	0.0563	8,468	8,234

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[a] Figures from 1960-74 were compiled from U.S. Office of Education (1948-78, 1960-77 annual reports). These figures do not include health professions. Biomedical science B.A. degrees for 1971-73 were estimated by CHR to remove the distortion in the series produced by a change in the survey taxonomy in 1971.

[b] Figures for 1960-64 were from U.S. Office of Education (1961-63). Figures for 1965-76 were from U.S. Office of Education (1973-77); those for 1965-68 were estimates.

[c] Estimated from 1960 to 1967 at 98 percent of previous column. Data after 1967 were obtained by subtracting first professional enrollment (U.S. Office of Education, 1959-77; fall 1967-77 reports) from previous column.

APP. F2 Determinants of Academic Employment for Biomedical Science Ph.D.'s

	Enrollments						
Fiscal Year	Total Biomed. Sci. and Grad. and Undergrad. (S)	Estimated Biomed. Sci. Undergrad.[a]	Biomed. Sci. Graduate[b]	Medical and Dental Schools[c]	Estimated Biomed. Sci. Academically Employed Ph.D.'s[d] (excl. postdocs) (F)	Ratio of Biomed. Sci. Academically Employed Ph.D.'s Relative to Total Bio. Enrollment (F/S)	Life Science R and D in Colleges and Univ.[e] (thousands of 1967 $) (LSRD)
1960	153,754	143,037	10,717	43,665	8,194	0.0533	430,132
1961	217,311	161,236	12,207	43,868	8,667	0.0399	495,719
1962	241,946	183,890	13,465	44,591	9,140	0.0378	569,381
1963	265,787	205,839	14,881	45,067	10,220	0.0385	662,190
1964	286,169	223,002	17,475	45,692	11,300	0.0395	759,013
1965	279,693	213,042	20,347	46,304	12,085	0.0432	829,224
1966	302,193	231,977	23,361	46,855	12,870	0.0426	909,631
1967	312,108	239,917	24,347	47,844	14,496	0.0464	951,856
1968	328,160	251,170	27,497	49,493	16,122	0.0491	989,533
1969	359,360	279,349	28,770	51,241	17,652	0.0491	1,004,689
1970	384,027	299,507	30,843	53,677	19,181	0.0499	1,029,525
1971	414,661	325,018	32,603	57,040	21,134	0.0510	1,037,347
1972	438,050	343,587	33,508	60,955	23,087	0.0527	1,039,662
1973	480,078	379,268	34,888	65,922	24,940	0.0519	1,124,474
1974	511,247	404,881	36,111	70,255	27,145	0.0531	1,129,156
1975	540,977	428,443	38,314	74,220	28,582	0.0528	1,208,974
1976	579,907	463,574	39,322	77,011	29,790	0.0514	1,215,266

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[a] Estimated by the formula $U_i = (A_{i+2}/B_{i+2})C_i$, where U_i = bioscience undergraduate enrollment in year i, A_{i+2} = bioscience and health professions baccalaureate degrees awarded in year i + 2, B_{i+2} = total baccalaureate degrees awarded in year i + 2, C_i = total undergraduate degree credit enrollment in year i. First professionals were excluded in this computation. See Appendix F1 for supporting data.

[b] From U.S. Office of Education (1959-77) except the figure for 1966, which was estimated by CHR.

[c] Medical school enrollment figures from JAMA (1960-77, 1977 report). Dental school enrollment figures from the American Association of Dental Schools.

[d] Figures in 1960-71 were estimated by CHR. Figures in 1972-76 were from NRC (1973-77).

[e] Figures for even years in 1964-70 and 1972-76 from NSF (1975-77). Figures for other years were estimated by CHR.

APP. F3 National Expenditures for Health-related R and D (billions of dollars)

	Actual Dollars[a]				Constant 1967 Dollars[b]			
Year	Total	Federal	Private Industry	Other	Total	Federal	Private Industry	Other
1952	0.197	0.103	0.052	0.042				
1953	0.214	0.107	0.058	0.049				
1954	0.237	0.119	0.061	0.057				
1955	0.261	0.139	0.062	0.060				
1956	0.312	0.162	0.079	0.071				
1957	0.440	0.229	0.126	0.085				
1958	0.543	0.279	0.170	0.094				
1959	0.648	0.351	0.190	0.107				
1960	0.900	0.448	0.253	0.199				
1961	1.096	0.574	0.312	0.200	1.328	0.695	0.378	0.242
1962	1.337	0.782	0.336	0.219	1.571	0.918	0.394	0.257
1963	1.545	0.919	0.375	0.251	1.766	1.050	0.429	0.287
1964	1.710	1.049	0.400	0.261	1.904	1.168	0.445	0.291
1965	1.903	1.174	0.450	0.279	2.053	1.266	0.485	0.301
1966	2.124	1.316	0.510	0.298	2.215	1.372	0.531	0.311
1967	2.359	1.459	0.580	0.320	2.359	1.459	0.580	0.320
1968	2.576	1.582	0.661	0.333	2.458	1.510	0.631	0.318
1969	2.784	1.674	0.754	0.356	2.531	1.522	0.685	0.324
1970	2.827	1.667	0.795	0.365	2.437	1.437	0.685	0.315
1971	3.133	1.877	0.860	0.396	2.558	1.532	0.702	0.323
1972	3.478	2.147	0.925	0.406	2.673	1.650	0.711	0.312
1973	3.691	2.225	1.033	0.433	2.714	1.636	0.760	0.318
1974	4.415	2.754	1.187	0.474	3.064	1.911	0.824	0.329
1975	4.640	2.799	1.322	0.519	2.954	1.782	0.842	0.330
1976[c]	4.988	3.023	1.438	0.527	2.898	1.757	0.836	0.306
1977[d]	5.526	3.351	1.625	0.550	2.936	1.781	0.863	0.292

[a] Figures for 1952-62 were supplied by the Office of Resource Analysis, NIH. Figures for 1963-77 were from NIH (1966-78, 1978 report).

[b] Computed by using the price index developed by NSF (1972) for deflating academic R and D. See Appendix F7.

[c] Figures for 1976 include transition quarter funds.

[d] Estimated.

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APP. F4 Research and Development Expenditures in Higher Education and Selected Fields for Selected Fiscal Years (millions of dollars)

Fiscal Year	Total Res. and Dev. in Higher Education[a]		HEW Res. and Dev. in Psych. and Soc. Sci.[b]		NIH Research Grants Expenditures[c]	
	Current $	1967 $	Current $	1967 $	Current $	1967 $
1936	22	53.0				
1937	24	55.8				
1938	25	59.2				
1939	26	62.5				
1940	27	64.3				
1941	30	68.1				
1942	34	69.7				
1943	46	88.8				
1944	58	110.1				
1945	72	133.6				
1946	87	148.7				
1947	123	183.9				
1948	159	220.5				
1949	192	268.9				
1950	225	312.1				
1951	272	349.6				
1952	318	400.0				
1953	376	469.4				
1954	431	535.4				
1955	492	613.5				
1956	566	695.3				
1957	650	771.1				
1958	749	864.9				
1959	864	989.7	13	16.8		
1960	1,006	1,134.2	17	21.3		
1961	1,173	1,309.2	42	50.9		
1962	1,374	1,516.6	54	63.5		
1963	1,611	1,756.8	67	76.6		
1964	1,904	2,049.5	89	99.1		
1965	2,103	2,225.4	115	124.1	472.6	509.8
1966	2,345	2,412.6	131	136.6	528.6	551.2
1967	2,594	2,594.0	140	140.0	593.3	593.3
1968	2,868	2,752.4	127	121.2	620.2	591.8
1969	2,945	2,682.1	151	137.3	621.2	564.7
1970	3,072	2,641.4	145	125.0	596.6	514.3
1971	3,216	2,651.3	185	151.0	671.7	548.3
1972	3,440	2,745.4	184	141.4	797.8	613.2
1973	3,757	2,822.7	160	177.6	811.6	596.8
1974	3,882	2,639.0	189	131.2	1,075.9	746.6
1975	4,380	2,717.1	166	105.7	1,119.1	712.3
1976	4,740(est.)	2,780.1(est.)	222	128.9	1,504.7	874.3

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[a] Data before 1953 were from U.S. Bureau of the Census (1975). Odd years were obtained by interpolation. Data from 1953 from NSF (1977). These include Federally Funded Research and Development Centers administered by individual universities and colleges and by university consortia. Consumer price index (U.S. Bureau of the Census, 1974 and 1975) was used to obtain 1967 $ amounts.

[b] From NSF (1960-77). Figures for 1960 and 1962 were NSF estimates. R and D price index (NSF, 1972) was used to obtain 1967 $ amounts. R and D price index for 1959 and 1960 were estimated at 77.5 and 80.0, respectively, by CHR.

[c] Basic data from NIH (1966-78, 1978 report). Figures include general research support programs. R and D price index was used to obtain 1967 $ amounts.

APP. F5 Determinants of Academic Employment for Behavioral Ph.D.'s

Fiscal Year	Enrollments: Total Behavioral Grad. and Undergrad. (S)	Enrollments: Estimated Behavioral Graduate[a]	Enrollments: Estimated Behavioral Undergrad.[b]	Total Behavioral B.A.'s[c]	Ratio of Behavioral B.A.'s to Total B.A.'s[d]	Estimated Behavioral Academically Employed Ph.D.'s (incl. postdocs)[e] (F)	Ratio of Behav. Academically Employed Ph.D.'s to Total Behavioral Enrollment (F/S)	Behav. Science R and D in Colleges and Universities[f] (thousand 1967 $)
1960	169,193	8,965	160,228			3,373	0.0199	29,303
1961	190,401	10,562	179,839	16,527	0.0452	3,612	0.0190	33,758
1962	220,541	10,409	210,132	18,398	0.0481	3,851	0.0175	38,773
1963	252,905	11,873	241,032	20,862	0.0508	4,862	0.0192	45,093
1964	299,509	13,915	285,594	25,376	0.0551	5,873	0.0196	51,857
1965	310,966	15,339	295,627	28,820	0.0585	6,465	0.0208	56,528
1966	376,403	17,563	358,840	33,728	0.0644	7,056	0.0187	62,714
1967	425,949	19,105	406,844	39,072	0.0695	8,186	0.0192	77,417
1968	488,820	22,744	466,076	48,295	0.0758	9,315	0.0191	93,390
1969	557,328	25,514	531,814	59,040	0.0804	10,491	0.0188	89,304
1970	627,836	27,375	600,461	68,413	0.0857	11,666	0.0186	89,339
1971	677,508	29,531	647,977	76,202	0.0901	13,055	0.0193	94,592
1972	713,035	31,033	682,002	84,203	0.0942	14,443	0.0203	99,827
1973	700,271	32,689	667,582	89,715	0.0964	15,259	0.0218	99,542
1974	675,489	33,111	642,378	94,154	0.0987	17,451	0.0258	95,654
1975	707,565	34,368	673,197	88,877	0.0954	18,433	0.0261	94,533
1976	789,523	35,385	754,138	83,521	0.0894	19,269	0.0244	83,000

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[a] Estimated by CHR. These include sociology, anthropology, nonclinical psychology.

[b] Estimated by the formula $U_i = (A_{i+2}/B_{i+2})C_i$, where U_i = behavioral science undergraduate enrollments in year i, A_{i+2} = behavioral sciences baccalaureate degrees awarded in year i+2, B_{i+2} = total baccalaureate degrees awarded in year i+2, C_i = total undergraduate enrollments in year i (excluding first professionals). See Appendix F1 for supporting data.

[c] Figures prior to 1975 were from U.S. Office of Education (1948-78, 1961-77 annual reports).

[d] See Appendix F1 for total B.A. degrees.

[e] Figures for 1960-71 were estimated by CHR. Figures for 1972-76 were from NRC (1973-77).

[f] Figures for even years in 1960-70 and 1972-76 from NSF (1975-77). Figures for other years were estimated by CHR.

APP. F6 Medical School Full-time Faculty, Budgeted Full-time Faculty Vacancies, and Student Enrollments, 1961-77

	Full-time Faculty Positions											
	Filled Positions			Budgeted Vacancies			Student Enrollments			Clin. Faculty Relative to		
Fiscal Year	Total	Clin. Depts.	Basic Sc. Depts.	Total	Clin. Depts.	Basic Sc. Depts.	Total	Med. Student	Other Med. Equiv.	Total Enroll.	Med. Stu.	Total Faculty Relative to Total Enrollment
1961	11,111	7,108	4,003	784	515	305	63,457	30,288	33,169	0.1120	0.2346	0.1751
1962	12,040	7,698	4,342	836	488	348	65,205	30,836	34,369	0.1181	0.2496	0.1846
1963	13,681	8,965	4,716	826	476	350	66,864	31,491	35,373	0.1341	0.2646	0.2046
1964	14,468	9,632	4,836	915	514	401	69,929	32,001	37,928	0.1377	0.3009	0.2069
1965	15,514	10,381	4,133	955	579	376	72,932	32,428	40,504	0.1423	0.3201	0.2127
1966	17,149	11,489	5,660	1,115	672	443	76,170	32,835	43,335	0.1506	0.3499	0.2251
1967	19,296	13,292	6,004	1,374	854	520	79,625	33,423	46,202	0.1669	0.3977	0.2423
1968	22,163	15,435	6,728	1,585	1,015	570	86,082	34,538	51,544	0.1793	0.4469	0.2575
1969	23,014	16,627	7,098	1,691	1,112	579	91,046	35,833	55,213	0.1826	0.4640	0.2528
1970	24,706	17,183	7,523	1,634	1,093	541	92,678	37,669	55,009	0.1854	0.4562	0.2666
1971	26,504	18,451	8,053	1,490	982	508	98,012	40,487	57,525	0.1882	0.4557	0.2704
1972	29,469	20,902	8,567	1,737	1,241	496	109,984	43,650	66,334	0.1900	0.4788	0.2679
1973	33,550	24,047	9,503	1,846	1,271	575	118,587	47,546	71,041	0.2028	0.5058	0.2829
1974	33,172	23,643	9,529	2,092	1,492	601	119,568	49,808	69,760	0.1977	0.4747	0.2774
1975	36,336	26,280	10,056	2,173	1,564	609	142,238	53,143	89,095	0.1848	0.4945	0.2555
1976	39,330	28,602	10,728	2,484	1,812	672	NA	56,244	NA	NA	0.5085	NA
1977	41,394	30,207	11,187	2,455	1,822	633	NA	58,266	NA	NA	0.5184	NA

SOURCE: JAMA (1960-77).

APP. F7 Medical School R and D Expenditures and Professional Fee Income, 1959-76[a] (thousands of dollars)

Fiscal Year	R and D in Medical Schools Current Dollars Total	 Federal	 Nonfed.	 1967 Dollars Total	 Federal	 Nonfed.	Professional Fee Income Current $	 1967 $	Price Index (1967 = 100) R and D[b]	 Consumer[c]
1959	113,706	74,128	39,577	113,706	95,649	51,067	10,635	13,723	77.5	87.3
1960	136,076	93,349	42,728	136,076	116,686	53,410	10,909	13,636	80.0	88.7
1961	167,515	118,891	48,624	203,048	144,110	58,938	12,838	15,561	82.5	89.6
1962	206,234	156,667	49,567	242,343	184,098	58,246	15,500	18,214	85.1	90.6
1963	264,418	206,705	57,713	302,192	236,234	65,958	16,681	19,064	87.5	91.7
1964	311,845	252,284	59,561	347,266	280,940	66,326	18,576	20,686	89.0	92.9
1965	342,901	280,562	62,338	369,904	302,656	67,247	21,840	23,560	92.7	94.5
1966	375,116	307,402	67,715	391,153	320,544	70,610	25,203	26,281	95.9	97.2
1967	420,232	344,480	75,751	420,232	344,480	75,751	30,248	30,248	100.0	100.0
1968	473,270	389,609	83,661	451,594	371,764	79,829	48,051	45,850	104.8	104.2
1969	489,314	395,814	93,500	444,831	359,831	85,000	65,304	59,367	110.0	109.8
1970	489,607	381,788	107,819	421,822	329,128	92,947	89,554	77,202	116.0	116.3
1971	480,979	366,006	114,973	392,636	298,780	93,856	115,191	94,034	122.5	121.3
1972	550,859	440,420	110,439	423,412	338,524	84,888	142,041	109,178	130.1	125.3
1973	587,678	472,772	114,906	432,116	347,626	84,490	158,607	116,623	136.0	133.1
1974	648,000	519,000	129,000	449,687	345,808	87,888	200,921	139,432	144.1	147.7
1975	771,000	614,000	157,000	490,770	389,798	99,923	303,028	192,889	157.1	161.2
1976	823,000	656,000	167,000	478,211	381,174	97,037	397,000	230,680	172.1	170.5

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[a] From JAMA (1960-77).

[b] Figures for 1959 and 1960 were estimated by CHR. Figures for 1961-71 were from NSF (1972). Figures for 1972-76 were were provided by Dr. Herbert Wooley of NIH.

[c] From U.S. Bureau of the Census (1974, 1975).

APP. F8 Estimated Clinical R and D in Medical Schools[a]

Fiscal Year	NIH Clinical Research as a % of Total Research Obligation[b]	Medical Schools (thousand 1967 $)		Weighted 5-yr. Average of Clinical R and D + Professional Fee Income
		Estimated Clinical R and D	Clinical R and D + Professional Fee Income	
1959	9.0	13,205	26,928	
1960	9.5	16,159	29,795	
1961	10.0	20,305	35,866	30,596
1962	12.0	29,081	47,295	37,206
1963	13.5	40,796	59,860	47,579
1964	15.0	52,090	72,776	59,948
1965	16.5	61,034	84,594	72,501
1966	18.0	70,408	96,689	84,663
1967	20.0	84,046	114,294	98,066
1968	22.5	101,609	147,459	118,184
1969	25.0	111,208	170,575	144,947
1970	28.0	118,181	195,383	170,998
1971	30.0	117,791	211,825	193,291
1972	32.0	135,492	244,670	215,925
1973	34.0	146,920	263,543	241,177
1974	34.0	152,894	292,326	266,020
1975	39.0	191,400	384,289	308,121
1976	37.0	176,938	421,964	368,182

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[a] From Appendix F7 and Appendix H.

[b] Estimates for 1969-75 were derived from data supplied by John James, Division of Research Grants, NIH. Other years were estimated by CHR.

APPENDIX G

BEHAVIORAL PH.D. SURVEY DATA

APP. G1.1 CURRENT (OCTOBER 1976) EMPLOYMENT STATUS--ACADEMIC

PHD FIELD/YEAR/SUPPORT/SEX	ALL PHD'S SURVEY RESP	 EST TOTAL	PERCENT CURRENTLY IN POST DOC	 F-T EMPL	 P-T EMPL
TOTAL BEHAVIORAL SCIENCES	2267	8130	3.9	92.3	3.7
ANTHROPOLOGY	288	1087	2.0	93.1	4.9
BIOLOGICAL & MEDICAL	49	175	1.7	94.9	3.4
CULTURAL & SOCIAL	215	813	2.3	91.9	5.8
OTHER	25	99		100.0	
PSYCHOLOGY	1459	4690	5.8	90.4	3.8
COGNITIVE	81	298	7.7	83.9	8.4
HUMAN DEVEL & GERONTOL	313	895	3.2	92.1	4.7
HUMAN LEARNING & PERFORM	97	364	2.7	94.0	3.3
NEUROBEHAVIORAL SCIENCES	84	207	15.5	83.6	1.0
PERCEPTUAL & SENSORY	58	213	5.6	89.2	5.2
PERSONALITY & EXPERMNTL	34	163		95.7	4.3
PHYSIOL & COMPARATIVE	185	449	20.3	75.0	4.7
PSYCHOLINGUISTICS	33	104	6.7	85.6	7.7
PSYCHOPHYSICS & -METRICS	49	124	5.6	94.4	
SOCIAL	302	1034	1.9	95.0	3.1
OTHER	226	840	4.9	93.0	2.1
SOCIOLOGY	278	1643	.5	97.0	2.5
COMPLEX ORGANIZ & PROF	48	316		99.1	.9
CRIMINOLOGY&DEVIANT BEH	43	222	1.8	96.8	1.4
DEMOGRAPHY	25	118	.8	89.8	9.3
MEDICAL	50	218		98.6	1.4
OTHER	112	769	.4	96.9	2.7
OTHER BEHAVIORAL SCIENCES	242	710	2.7	93.2	4.1
COMMUNICATIONS SCIENCES	107	309	1.3	93.9	4.9
ETHOLOGY & SOCIOBIOLOGY	35	121	5.8	92.6	1.7
OTHER	100	280	2.9	92.9	4.3
FY 1971 PHD'S	383	1570	1.3	95.0	3.6
FY 1972 PHD'S	380	1625	.6	94.9	4.5
FY 1973 PHD'S	389	1456	2.0	94.1	3.9
FY 1974 PHD'S	430	1709	5.2	91.0	3.8
FY 1975 PHD'S	685	1791	9.7	87.6	2.7
NIH/ADAMHA/HRA PREDOCS	895	2402	6.0	90.8	3.2
OTHER BEHAVIORAL PHD'S	1372	5728	3.1	93.0	3.9
MALE	1548	5680	3.0	95.6	1.4
FEMALE	719	2450	6.2	84.7	9.1

SOURCE: NRC, Survey of Biomedical and Behavioral Scientists, Washington, D.C., 1976.

APP. G1.2 CURRENT (OCTOBER 1976) EMPLOYMENT STATUS--NONACADEMIC

PHD FIELD/YEAR/SUPPORT/SEX	ALL PHD'S		PERCENT CURRENTLY IN		
	SURVEY RESP	EST TOTAL	POST DOC	F-T EMPL	P-T EMPL
TOTAL BEHAVIORAL SCIENCES	675	2498	3.1	90.8	6.2
ANTHROPOLOGY	44	168	2.4	83.9	13.7
BIOLOGICAL & MEDICAL	3	13		100.0	
CULTURAL & SOCIAL	30	108	3.7	80.6	15.7
OTHER	11	47		87.2	12,8
PSYCHOLOGY	479	1652	3.6	91.0	5.4
COGNITIVE	32	124		92.7	7.3
HUMAN DEVEL & GERONTOL	89	270	6.7	85.6	7.8
HUMAN LEARNING & PERFORM	37	157	3.8	93.0	3.2
NEUROBEHAVIORAL SCIENCES	22	87	13.8	70.1	16.1
PERCEPTUAL & SENSORY	11	33		100.0	
PERSONALITY & EXPERMNTL	12	63		100.0	
PHYSIOL & COMPARATIVE	51	138	6.5	87.0	6.5
PSYCHOLINGUISTICS	5	12		91.7	8.3
PSYCHOPHYSICS & -METRICS	29	50	2.0	98.0	
SOCIAL	107	354	.6	96.3	3.1
OTHER	84	364	3.0	91.8	5.2
SOCIOLOGY	80	451	2.7	91.1	6.2
COMPLEX ORGANIZ & PROF	22	152		86.8	13.2
CRIMINOLOGY&DEVIANT BEH	8	23		100.0	
DEMOGRAPHY	14	72	16.7	77.8	5.6
MEDICAL	13	49		95.9	4.1
OTHER	23	155		98.7	1.3
OTHER BEHAVIORAL SCIENCES	72	227	.9	93.0	6.2
COMMUNICATIONS SCIENCES	32	99		94.9	5.1
ETHOLOGY & SOCIOBIOLOGY	8	37		75.7	24.3
OTHER	32	91	2.2	97.8	
FY 1971 PHD'S	96	411	4.4	85.9	9.7
FY 1972 PHD'S	93	381	4.5	92.1	3.4
FY 1973 PHD'S	121	538		98.1	1.9
FY 1974 PHD'S	144	599	2.5	86.3	11.2
FY 1975 PHD'S	221	569	4.7	91.0	4.2
NIH/ADAMHA/HRA PREDOCS	213	581	3.6	85.2	11.2
OTHER BEHAVIORAL PHD'S	462	1917	2.9	92.4	4.6
MALE	503	1930	3.5	92.7	3.8
FEMALE	172	568	1.8	84.0	14.3

SOURCE: NRC, Survey of Biomedical and Behavioral Scientists, Washington, D.C., 1976.

APP. G7.1 SECTOR OF EMPLOYMENT--ACADEMIC

	ALL EMPLOYED		PERCENT EMPLOYED OR ON POSTDOCTORAL APPOINTMENTS IN													
			EDUCATIONAL INSTITUTION					***GOVERNMENT***			****BUSINESS****			**OTHER SECTORS**		
PHD FIELD/YEAR/SUPPORT/SEX	SURVEY RESP	EST TOTAL	TOTAL	UNIV/ COLL	MED SCHL	PROF SCHL	OTHER EDUC	TOTAL	FEDL GOVT	OTHER GOVT	TOTAL	SELF EMPL	OTHER BUSN	TOTAL	HOSP/ CLINIC	OTHER TYPE
TOTAL BEHAVIORAL SCIENCES	2267	8130	100.0	80.5	8.1	2.9	8.5									
ANTHROPOLOGY	288	1087	100.0	87.3	4.8	1.9	6.0									
BIOLOGICAL & MEDICAL	48	175	100.0	70.9	20.0	4.6	4.6									
CULTURAL & SOCIAL	215	813	100.0	91.3	2.1	1.1	5.5									
OTHER	25	99	100.0	83.8		4.0	12.1									
PSYCHOLOGY	1459	4690	100.0	76.4	9.8	2.9	11.0									
COGNITIVE	81	298	100.0	82.6	8.1	2.0	7.4									
HUMAN DEVEL & GERONTOL	310	895	100.0	77.3	7.2	5.0	10.5									
HUMAN LEARNING & PERFORM	97	364	100.0	61.3	6.0	1.4	31.3									
NEUROBEHAVIORAL SCIENCES	84	207	100.0	41.5	48.8	8.7	1.0									
PERCEPTUAL & SENSORY	59	213	100.0	75.1	7.0	5.2	12.7									
PERSONALITY & EXPERMNTL	34	163	100.0	78.5	13.5	2.5	5.5									
PHYSIOL & COMPARATIVE	185	448	100.0	70.3	20.5	3.1	6.0									
PSYCHOLINGUISTICS	33	104	100.0	86.5	3.9		9.6									
PSYCHOPHYSICS & -METRICS	49	124	100.0	85.5	9.7	1.6	3.2									
SOCIAL	302	1034	100.0	90.3	4.4	1.7	3.6									
OTHER	226	840	100.0	72.0	7.0	.7	20.2									
SOCIOLOGY	278	1643	100.0	87.9	4.4	4.1	3.6									
COMPLEX ORGANIZ & PROF	48	316	100.0	91.8	1.3	6.0	.9									
CRIMINOLOGY&DEVIANT BEH	43	222	100.0	89.2		3.6	7.2									
DEMOGRAPHY	25	118	100.0	79.7		5.9	14.4									
MEDICAL	50	218	100.0	61.0	21.1	15.6	2.3									
OTHER	112	769	100.0	94.8	2.9		2.3									
OTHER BEHAVIORAL SCIENCES	242	710	100.0	80.0	10.7	2.5	6.8									
COMMUNICATIONS SCIENCES	107	309	100.0	78.0	9.4	2.6	10.0									
ETHOLOGY & SOCIOBIOLOGY	35	121	100.0	93.4	1.7		5.0									
OTHER	100	280	100.0	76.4	16.1	3.6	3.9									
FY 1971 PHD'S	383	1570	100.0	82.9	8.1	2.7	6.2									
FY 1972 PHD'S	380	1605	100.0	81.2	8.2	1.6	9.0									
FY 1973 PHD'S	389	1456	100.0	80.2	7.4	4.3	8.0									
FY 1974 PHD'S	430	1708	100.0	77.5	8.6	4.0	9.9									
FY 1975 PHD'S	685	1791	100.0	80.8	8.2	2.0	8.9									
NIH/ADAMHA/HRA PREDOCS	895	2402	100.0	79.7	11.1	4.0	5.2									
OTHER BEHAVIORAL PHD'S	1372	5728	100.0	80.9	6.9	2.5	9.8									
MALE	1549	5680	100.0	83.0	7.7	1.6	7.8									
FEMALE	719	2450	100.0	74.9	9.2	5.9	10.0									

SOURCE: NRC, Survey of Biomedical and Behavioral Scientists, Washington, D. C., 1976.

APP. G2.2 SECTOR OF EMPLOYMENT--NONACADEMIC

	ALL EMPLOYED		PERCENT EMPLOYED OR ON POSTDOCTORAL APPOINTMENTS IN													
			EDUCATIONAL INSTITUTION					***GOVERNMENT***			****BUSINESS****			**OTHER SECTORS**		
PHD FIELD/YEAR/SUPPORT/SEX	SURVEY RESP	EST TOTAL	TOTAL	UNIV/ COLL	MED SCHL	PROF SCHL	OTHER EDUC	TOTAL	FEDL GOVT	OTHER GOVT	TOTAL	SELF EMPL	OTHER BUSN	TOTAL	HOSP/ CLNIC	OTHER TYPE
TOTAL BEHAVIORAL SCIENCES	661	2498						37.6	21.6	16.0	27.6	12.6	15.1	34.8	12.8	21.9
ANTHROPOLOGY	38	168						40.1	19.7	20.4	21.1	15.0	6.1	38.8	11.6	27.2
BIOLOGICAL & MEDICAL	3	13						30.8		30.8				69.2	46.2	23.1
CULTURAL & SOCIAL	24	108						27.6	18.4	9.2	27.6	17.2	10.3	44.8	5.7	39.1
OTHER	11	47						66.0	27.7	38.3	14.9	14.9		19.1	12.8	6.4
PSYCHOLOGY	474	1652						38.4	20.8	17.6	27.5	11.1	16.5	34.1	13.7	20.4
COGNITIVE	32	124						26.6	16.1	10.5	39.5	11.3	28.2	33.9	20.2	13.7
HUMAN DEVEL & GERONTOL	88	270						29.6	7.1	22.5	18.4	15.4	3.0	52.1	22.5	29.6
HUMAN LEARNING & PERFORM	37	157						54.8	31.8	22.9	21.0	9.6	11.5	24.2	12.7	11.5
NEUROBEHAVIORAL SCIENCES	21	87						40.5	20.2	20.2	10.7	7.1	3.6	48.8	19.0	29.8
PERCEPTUAL & SENSORY	11	33						30.3	30.3		63.6	9.1	54.5	6.1		6.1
PERSONALITY & EXPERMNTL	12	63						57.1	17.5	39.7	4.8		4.8	38.1	20.6	17.5
PHYSIOL & COMPARATIVE	51	138						53.6	37.0	16.7	26.8	21.0	5.8	19.6	11.6	9.0
PSYCHOLINGUISTICS	5	12						50.0	25.0	25.0	41.7	16.7	25.0	8.3	8.3	
PSYCHOPHYSICS & -METRICS	29	50						36.0	28.0	8.0	30.0	4.0	26.0	34.0		34.0
SOCIAL	106	354						35.9	21.0	14.9	33.2	13.7	19.5	30.9	10.5	20.4
OTHER	82	364						35.1	19.9	15.2	31.7	5.9	25.8	33.1	10.1	23.0
SOCIOLOGY	77	451						33.7	20.3	13.4	30.7	14.4	16.3	35.6	6.1	29.5
COMPLEX ORGANIZ & PROF	22	152						5.9	2.0	3.9	55.3	22.4	32.9	38.8	11.2	27.6
CRIMINOLOGY&DEVIANT BEH	8	23						56.5	30.4	26.1	17.4		17.4	26.1		26.1
DEMOGRAPHY	13	72						71.0	64.5	6.5	14.5	4.8	9.7	14.5		14.5
MEDICAL	13	49						59.2	42.9	16.3	4.1	4.1		36.7	4.1	32.7
OTHER	21	155						34.8	10.9	23.9	22.5	15.9	6.5	42.8	5.1	37.7
OTHER BEHAVIORAL SCIENCES	72	227						37.9	30.8	7.0	26.9	18.5	8.4	35.2	19.8	15.4
COMMUNICATIONS SCIENCES	32	99						39.4	29.3	10.1	25.3	19.2	6.1	35.4	28.3	7.1
ETHOLOGY & SOCIOBIOLOGY	8	37						37.8	37.8		48.6	27.0	21.6	13.5		13.5
OTHER	32	91						36.3	29.7	6.6	19.8	14.3	5.5	44.0	18.7	25.3
FY 1971 PHD'S	92	411						42.9	20.6	22.3	27.3	15.5	11.8	29.8	14.5	15.3
FY 1972 PHD'S	91	381						46.9	30.9	16.0	24.9	14.6	10.3	28.2	7.6	20.6
FY 1973 PHD'S	119	538						29.4	18.7	10.7	30.5	13.7	16.8	40.1	12.0	28.1
FY 1974 PHD'S	141	599						38.5	21.5	17.0	28.1	12.0	16.1	33.3	13.4	20.0
FY 1975 PHD'S	218	569						34.5	18.9	15.6	26.4	8.6	17.8	39.1	15.3	23.9
NIH/ADAMHA/HRA PREDOCS	208	581						36.8	22.3	14.5	23.4	15.5	7.9	39.8	17.0	22.9
OTHER BEHAVIORAL PHD'S	453	1917						37.9	21.3	16.5	28.9	11.7	17.2	33.2	11.6	21.7
MALE	492	1930						39.0	24.1	14.9	29.9	12.4	17.5	31.0	12.2	18.8
FEMALE	169	568						32.9	13.1	19.7	19.9	13.1	6.8	47.2	14.9	32.3

SOURCE: NRC, Survey of Biomedical and Behavioral Scientists, Washington, D.C., 1976.

APP. G3.1 TIME SPENT ON RESEARCH AND OTHER WORK ACTIVITIES--ACADEMIC

PHD FIELD/YEAR/SUPPORT/SEX	ALL EMPLOYED SURVEY RESP	 EST TOTAL	PERCENT OF TIME SPENT IN R&D	 TEACH	 MGMT/ ADMIN	 CON SULT	 OTHER PROF SERV	 OTHER ACTIVITY	PERCENT WITH SOME TIME IN RESEARCH
TOTAL BEHAVIORAL SCIENCES	2261	8130	29.3	48.7	11.7	4.4	4.4	1.7	89.6
ANTHROPOLOGY	286	1087	29.6	54.1	10.4	2.4	1.8	1.6	96.1
BIOLOGICAL & MEDICAL	48	175	33.8	53.9	5.4	3.2	2.1	1.5	98.3
CULTURAL & SOCIAL	213	813	28.3	55.1	10.9	2.3	1.7	1.7	92.9
OTHER	25	99	32.2	46.7	15.1	2.0	2.4	1.6	96.0
PSYCHOLOGY	1458	4690	30.8	45.9	11.5	4.8	5.1	1.9	86.8
COGNITIVE	80	298	39.4	43.6	11.0	2.6	2.6	0.9	91.2
HUMAN DEVEL & GERONTOL	310	895	26.4	47.9	12.6	4.6	5.5	3.1	86.6
HUMAN LEARNING & PERFORM	97	364	21.3	45.6	15.7	7.6	8.2	1.5	73.6
NEUROBEHAVIORAL SCIENCES	84	207	55.4	28.8	9.3	3.6	2.5	0.4	97.6
PERCEPTUAL & SENSORY	58	213	32.2	50.9	8.6	2.1	4.5	1.7	91.1
PERSONALITY & EXPERMNTL	34	163	28.2	45.3	9.6	7.7	8.7	0.5	95.3
PHYSIOL & COMPARATIVE	185	448	45.5	43.3	7.5	1.1	1.5	1.0	90.4
PSYCHOLINGUISTICS	33	104	36.8	44.0	11.4	1.4	3.3	3.1	95.2
PSYCHOPHYSICS & -METRICS	49	124	26.6	55.8	9.0	4.7	2.3	1.5	84.7
SOCIAL	302	1034	28.7	48.9	11.5	4.0	4.0	2.9	89.8
OTHER	226	840	25.0	44.5	13.1	8.3	8.0	1.1	81.3
SOCIOLOGY	276	1643	27.4	53.3	12.2	3.6	2.7	0.7	95.2
COMPLEX ORGANIZ & PROF	48	316	24.7	55.6	12.4	4.1	2.1	1.1	95.9
CRIMINOLOGY&DEVIANT BEH	42	222	31.5	48.9	11.0	3.4	4.0	1.3	96.7
DEMOGRAPHY	25	118	27.2	46.4	12.6	5.6	7.3	0.8	88.1
MEDICAL	50	218	26.6	50.6	16.2	3.1	2.5	1.0	97.7
OTHER	111	769	27.7	55.5	11.3	3.2	1.9	0.3	95.0
OTHER BEHAVIORAL SCIENCES	241	710	33.6	48.3	13.7	3.9	8.1	2.3	88.3
COMMUNICATIONS SCIENCES	107	309	21.7	45.5	14.4	5.3	11.1	1.9	87.7
ETHOLOGY & SOCIOBIOLOGY	35	121	32.0	56.8	6.9	1.8	2.0	0.4	97.5
OTHER	99	280	22.0	47.6	16.0	3.1	7.5	3.6	84.9
FY 1971 PHD'S	381	1570	27.3	48.0	14.2	4.7	4.6	1.1	92.9
FY 1972 PHD'S	377	1605	27.6	48.6	13.5	4.0	3.9	2.4	87.6
FY 1973 PHD'S	389	1456	28.2	47.8	13.5	4.2	4.4	1.9	86.9
FY 1974 PHD'S	430	1708	31.8	49.1	9.1	4.5	4.2	1.2	93.6
FY 1975 PHD'S	694	1791	31.1	49.8	9.0	3.4	5.0	1.8	88.6
NIH/ADAMHA/HRA PREDOCS	893	2402	35.9	45.3	10.8	3.3	3.6	1.2	93.9
OTHER BEHAVIORAL PHD'S	1368	5728	26.6	50.1	12.1	4.5	4.8	1.9	87.8
MALE	1546	5680	29.2	49.2	11.8	4.3	4.3	1.1	91.2
FEMALE	715	2450	29.5	47.5	11.6	3.7	4.8	2.9	85.8

SOURCE: NRC, Survey of Biomedical and Behavioral Scientists, Washington, D.C., 1976.

APP. G3.2 TIME SPENT ON RESEARCH AND OTHER WORK ACTIVITIES--NONACADEMIC

PHD FIELD/YEAR/SUPPORT/SEX	ALL EMPLOYED SURVEY RESP	EST TOTAL	PERCENT OF TIME SPENT IN R&D	TEACH	MGMT/ ADMIN	CON SULT	OTHER PROF SERV	OTHER ACTIVITY	PERCENT WITH SOME TIME IN RESEARCH
TOTAL BEHAVIORAL SCIENCES	636	2498	31.4	5.3	22.9	16.8	21.1	2.5	74.5
ANTHROPOLOGY	35	168	46.1	2.7	28.7	9.5	8.8	4.3	89.2
BIOLOGICAL & MEDICAL	3	13	44.0	6.0	20.0	0.0	30.0	0.0	100.0
CULTURAL & SOCIAL	21	108	65.8	0.3	7.8	13.8	2.1	10.3	97.5
OTHER	11	47	29.1	4.1	49.1	7.7	10.0	0.0	72.3
PSYCHOLOGY	458	1652	29.0	5.8	23.0	17.1	22.6	2.5	71.5
COGNITIVE	30	124	24.6	4.2	15.4	28.6	21.9	5.2	58.3
HUMAN DEVEL & GERONTOL	85	270	13.1	8.2	17.9	14.2	43.5	3.0	69.7
HUMAN LEARNING & PERFORM	37	157	33.9	6.4	23.1	10.9	25.7	0.0	74.5
NEUROBEHAVIORAL SCIENCES	21	87	40.2	1.9	14.6	8.1	28.9	6.2	54.8
PERCEPTUAL & SENSORY	10	33	75.4	0.5	10.4	7.9	5.9	0.0	100.0
PERSONALITY & EXPERMNTL	12	63	14.1	7.3	41.6	14.4	22.6	0.0	69.8
PHYSIOL & COMPARATIVE	48	138	38.3	3.3	29.6	12.5	13.0	3.3	65.6
PSYCHOLINGUISTICS	4	12	69.0	9.0	9.0	5.0	8.0	0.0	90.0
PSYCHOPHYSICS & -METRICS	29	50	47.9	2.1	34.1	13.2	1.5	1.2	82.0
SOCIAL	101	354	26.7	7.6	24.6	18.1	20.9	2.2	71.6
OTHER	81	364	29.1	5.0	23.4	23.4	16.5	2.6	77.7
SOCIOLOGY	75	451	40.3	4.4	19.8	21.9	10.9	2.6	83.2
COMPLEX ORGANIZ & PROF	21	152	36.6	5.1	20.9	33.9	3.1	0.4	87.8
CRIMINOLOGY&DEVIANT BEH	7	23	28.6	4.3	23.6	12.9	5.0	25.7	80.0
DEMOGRAPHY	13	72	59.0	4.6	18.0	14.6	1.9	1.9	90.3
MEDICAL	13	49	49.4	5.1	19.7	10.0	12.1	3.6	81.6
OTHER	21	155	31.9	3.0	19.1	17.7	26.7	1.6	76.1
OTHER BEHAVIORAL SCIENCES	68	227	25.6	5.4	24.1	9.7	34.0	1.1	70.3
COMMUNICATIONS SCIENCES	31	99	19.5	5.6	29.4	8.6	36.8	0.0	75.3
ETHOLOGY & SOCIOBIOLOGY	7	37	61.4	0.0	5.4	31.8	1.4	0.0	66.7
OTHER	30	91	21.7	7.0	23.1	3.5	41.4	3.2	65.9
FY 1971 PHD'S	90	411	26.3	5.4	20.6	14.6	29.9	3.1	76.0
FY 1972 PHD'S	82	381	26.2	5.7	31.3	11.9	23.5	1.4	72.5
FY 1973 PHD'S	118	538	32.4	6.4	25.7	18.6	15.9	1.0	72.4
FY 1974 PHD'S	136	599	36.6	4.9	19.0	18.6	18.0	2.8	74.7
FY 1975 PHD'S	210	569	32.4	4.6	20.7	18.0	20.6	3.6	76.6
NIH/ADAMHA/HRA PREDOCS	193	581	35.2	5.3	18.9	14.0	22.8	3.6	76.7
OTHER BEHAVIORAL PHD'S	443	1917	30.3	5.3	23.9	17.5	20.7	2.2	73.9
MALE	473	1930	33.2	4.8	24.5	17.1	18.2	2.1	76.8
FEMALE	163	568	24.3	7.4	16.5	15.4	32.5	3.9	67.0

SOURCE: NRC, Survey of Biomedical and Behavioral Scientists, Washington, D.C., 1976.

APP. G4.1 ORIENTATION, HEALTH-RELATEDNESS, AND SUPPORT/SPONSORSHIP OF RESEARCH--ACADEMIC

	RESEARCHERS		PERCENT ENGAGED IN RESEARCH CHARACTERIZED AS										
			ORIENTED		**RELATED TO HEALTH**			***SUPPORTED OR SPONSORED BY***					
PHD FIELD/YEAR/SUPPORT/SEX	SURVEY RESP	EST TOTAL	CLINICALLY	OTHER	DIRECTLY	INDIRECTLY	NOT AT ALL	NON FEDL	TOTAL FEDL	NIH	ADAMHA	HRA	OTHER FEDL
TOTAL BEHAVIORAL SCIENCES	2030	7249	36.7	63.3	33.3	47.0	19.7	67.8	32.2	12.8	7.7	1.5	10.8
ANTHROPOLOGY	269	1017	15.1	84.9	25.3	48.6	26.1	69.7	30.3	8.2	5.8	.5	15.2
BIOLOGICAL & MEDICAL	47	172	15.3	84.7	36.3	53.6	10.1	69.8	30.2	18.5	3.7	1.2	10.5
CULTURAL & SOCIAL	198	750	16.5	83.5	23.9	50.3	25.8	71.8	28.2	6.4	7.1	.4	14.2
OTHER	24	95	4.2	95.8	15.4	26.4	58.2	53.8	46.2	3.3			42.4
PSYCHOLOGY	1288	4068	42.6	57.4	35.9	48.5	15.6	64.9	35.1	15.8	9.4	.8	13.8
COGNITIVE	74	269	33.1	66.9	17.3	57.1	25.6	67.2	32.8	17.0	7.8		12.9
HUMAN DEVEL & GERONTOL	276	775	62.3	37.7	39.8	49.5	10.7	64.3	35.7	11.1	19.0	.3	18.5
HUMAN LEARNING & PERFORM	70	268	47.8	52.2	36.7	46.4	16.9	67.7	32.3	4.4	7.3	2.4	17.3
NEUROBEHAVIORAL SCIENCES	81	202	34.7	65.3	69.6	29.4	1.0	33.5	66.5	34.0	22.0		15.5
PERCEPTUAL & SENSORY	53	194	35.3	64.7	34.3	51.4	14.4	70.8	29.2	23.2	.5		8.6
PERSONALITY & EXPERMNTL	30	139	66.7	33.3	43.4	44.2	12.4	75.2	24.8	7.4	17.4		8.3
PHYSIOL & COMPARATIVE	167	405	15.3	84.8	44.0	50.5	5.5	42.3	57.7	43.6	14.1	1.3	10.2
PSYCHOLINGUISTICS	31	99	41.6	58.4	20.4	64.5	15.1	66.7	33.3	28.1	7.3		3.1
PSYCHOPHYSICS & -METRICS	45	105	39.8	60.2	29.3	35.9	34.8	64.4	35.6	8.9	8.9	3.3	24.4
SOCIAL	276	929	35.7	64.3	30.1	50.0	19.9	72.0	28.0	9.1	5.7	1.4	15.3
OTHER	185	683	48.9	51.1	33.2	46.8	20.0	73.9	26.1	8.6	9.9		9.6
SOCIOLOGY	260	1539	24.3	75.7	28.8	43.9	27.2	72.7	27.3	6.9	6.7	4.3	15.4
COMPLEX ORGANIZ & PROF	45	303	30.0	70.0	26.3	41.6	32.0	80.5	19.5	3.8	5.1	4.5	11.0
CRIMINOLOGY&DEVIANT BEH	40	204	30.1	69.9	17.1	48.2	34.8	62.9	37.1	3.4	13.5	7.2	25.3
DEMOGRAPHY	22	106		100.0	34.8	46.7	18.5	57.4	42.6	8.9	19.8	6.3	13.9
MEDICAL	48	213	43.4	56.6	66.7	29.0	4.3	69.4	30.6	12.9	8.6	14.4	4.3
OTHER	105	715	18.2	81.8	20.1	49.2	31.8	75.1	24.9	7.1	3.0	1.4	18.2
OTHER BEHAVIORAL SCIENCES	213	625	64.7	35.3	40.8	41.3	17.9	71.4	28.6	15.5	1.4		13.3
COMMUNICATIONS SCIENCES	94	271	83.2	16.8	47.3	38.7	14.0	71.5	28.5	14.5	1.7		12.2
ETHOLOGY & SOCIOBIOLOGY	33	118	1.8	98.2	9.8	47.3	42.9	61.3	38.7	15.1	1.9		25.5
OTHER	86	236	75.6	24.4	49.5	41.1	9.3	76.4	23.6	16.8	1.0		7.2
FY 1971 PHD'S	365	1402	40.1	59.9	35.7	44.0	20.3	67.9	32.1	11.8	7.7	2.3	14.7
FY 1972 PHD'S	335	1398	36.4	63.6	30.3	49.3	20.5	69.7	30.3	11.1	6.1	.3	16.8
FY 1973 PHD'S	347	1265	37.6	62.4	34.8	48.2	17.0	65.1	34.9	14.4	11.6	1.4	14.3
FY 1974 PHD'S	392	1599	37.5	62.5	36.0	45.1	18.9	69.0	31.0	12.3	7.1	1.5	15.4
FY 1975 PHD'S	611	1585	32.6	67.4	30.0	48.3	21.6	67.9	32.1	14.4	6.4	1.9	13.1
NIH/ADAMHA/HRA PREDOCS	831	2239	36.3	63.7	39.4	50.3	10.3	59.2	40.8	18.2	13.7	2.4	13.2
OTHER BEHAVIORAL PHD'S	1199	5010	36.9	63.1	30.5	45.4	24.1	71.7	28.3	10.3	4.8	1.0	15.6
MALE	1419	5169	34.1	65.9	30.5	48.1	21.4	69.8	30.2	10.9	7.3	1.0	14.8
FEMALE	611	2080	43.4	56.6	40.5	44.1	15.4	62.5	37.5	17.7	9.5	2.8	15.1

SOURCE: NRC, Survey of Biomedical and Behavioral Scientists, Washington, D.C., 1976.

APP. G4.2 ORIENTATION, HEALTH-RELATEDNESS, AND SUPPORT/SPONSORSHIP OF RESEARCH--NONACADEMIC

			PERCENT ENGAGED IN RESEARCH CHARACTERIZED AS										
	RESEARCHERS		**ORIENTED**		**RELATED TO HEALTH**			***SUPPORTED OR SPONSORED BY***					
PHD FIELD/YEAR/SUPPORT/SEX	SURVEY RESP	EST TOTAL	CLINIC ALLY	OTHER	DIR ECTLY	INDIR ECTLY	NOT AT ALL	NON FEDL	TOTAL FEDL	NIH	ADAMHA	HRA	OTHER FEDL
TOTAL BEHAVIORAL SCIENCES	473	1750	44.2	55.8	38.6	39.8	21.5	38.1	61.9	7.1	11.0	2.8	47.9
ANTHROPOLOGY	31	124	42.1	57.9	31.4	11.4	57.1	23.7	76.3	3.1	9.3		73.2
BIOLOGICAL & MEDICAL	3	13	100.0		100.0			46.2	53.8	23.1	30.8		53.8
CULTURAL & SOCIAL	20	77	50.7	49.3	27.7	18.5	53.8	25.4	74.6		8.5		69.5
OTHER	8	34		100.0	7.4		92.6	8.0	92.0				92.0
PSYCHOLOGY	332	1132	46.9	53.1	40.0	39.9	20.1	39.9	60.1	7.5	12.0	1.0	46.3
COGNITIVE	20	67	44.8	55.2	31.3	10.4	58.2	30.2	69.8	7.9	14.3		47.6
HUMAN DEVEL & GERONTOL	56	182	66.1	33.9	58.6	30.5	10.9	71.6	28.4	4.7	11.2	1.2	16.0
HUMAN LEARNING & PERFORM	26	117	41.3	58.7	23.5	45.9	30.6	5.9	94.1	10.8			86.3
NEUROBEHAVIORAL SCIENCES	14	46	35.0	65.0	70.0	30.0		30.0	70.0	20.0	15.0		65.0
PERCEPTUAL & SENSORY	10	30	33.3	66.7	13.3	63.3	23.3	46.7	53.3				53.3
PERSONALITY & EXPERMNTL	9	44	50.0	50.0	45.5	50.0	4.5	12.9	87.1		12.9	9.7	83.9
PHYSIOL & COMPARATIVE	33	84	44.0	56.0	50.0	44.0	6.0	26.2	73.8	31.0	19.0		29.8
PSYCHOLINGUISTICS	3	9	33.3	66.7		100.0			100.0		50.0		50.0
PSYCHOPHYSICS & -METRICS	26	41	29.3	70.7	10.0	35.0	55.0	30.8	69.2	12.8	5.1	5.1	59.0
SOCIAL	74	237	58.3	41.7	50.5	30.3	19.3	42.7	57.3	2.7	15.9	1.4	46.4
OTHER	61	275	34.4	65.6	27.4	54.1	18.5	43.4	56.6	3.6	12.0		45.0
SOCIOLOGY	63	347	28.1	71.9	32.4	52.5	15.0	32.5	67.5	5.0	12.1	10.5	48.0
COMPLEX ORGANIZ & PROF	18	130	21.4	78.6	31.5	60.0	8.5	49.2	50.8		10.0	16.9	32.3
CRIMINOLOGY&DEVIANT BEH	6	16	50.0	50.0	14.3	42.9	42.9	14.3	85.7		35.7		85.7
DEMOGRAPHY	12	56	19.2	80.8	26.9	44.2	28.8	13.5	86.5	7.7	3.8	19.2	61.5
MEDICAL	10	40	52.5	47.5	90.0	10.0		37.5	62.5	15.0	15.0	5.0	37.5
OTHER	17	105	28.2	71.8	16.5	65.0	18.4	19.5	80.5	6.9	14.9		62.1
OTHER BEHAVIORAL SCIENCES	47	147	64.7	35.3	48.6	30.3	21.1	48.1	51.9	12.0	1.5		41.4
COMMUNICATIONS SCIENCES	23	73	78.3	21.7	56.5	27.5	15.9	43.5	56.5	16.1			46.8
ETHOLOGY & SOCIOBIOLOGY	5	18	16.7	83.3		66.7	33.3	44.4	55.6	33.3			22.2
OTHER	19	56	58.2	41.8	54.5	21.8	23.6	54.7	45.3		3.8		41.5
FY 1971 PHD'S	72	297	60.2	39.8	50.0	37.4	12.6	42.6	57.4	8.4	10.4	4.8	39.8
FY 1972 PHD'S	56	248	36.1	63.9	34.0	41.2	24.8	18.7	81.3	7.6	22.7	4.9	61.3
FY 1973 PHD'S	86	372	41.1	58.9	42.0	44.1	13.9	38.5	61.5	7.1	8.5	4.1	47.3
FY 1974 PHD'S	101	420	43.4	56.6	29.9	39.3	30.7	44.5	55.5	5.7	4.9	.3	47.2
FY 1975 PHD'S	158	413	41.8	58.2	39.2	37.1	23.7	40.0	60.0	7.5	12.8	1.3	46.4
NIH/ADAMHA/HRA PREDOCS	151	399	47.0	53.0	45.7	33.3	20.9	31.8	68.2	13.9	16.8	3.5	43.3
OTHER BEHAVIORAL PHD'S	322	1351	43.3	56.7	36.5	41.8	21.7	40.0	60.0	5.0	9.1	2.6	49.3
MALE	366	1387	42.4	57.6	36.4	39.0	24.6	35.7	64.3	6.6	10.6	3.0	50.6
FEMALE	107	363	51.4	48.6	47.7	43.2	9.1	48.8	51.2	9.2	12.6	1.7	35.8

SOURCE: NRC, Survey of Biomedical and Behavioral Scientists, Washington, D.C., 1976.

APP. G5.1 IMPORTANCE OF DOCTORATE AS CREDENTIAL FOR ATTAINING PRESENT POSITION--ACADEMIC

	F-T EMPLOYED,		PERCENT WHO CONSIDER DEGREE			
PHD FIELD/YEAR/SUPPORT/SEX	SURVEY RESP	EST TOTAL	ESSENTIAL	HELPFUL	NOT NEEDED	UNCERTAIN
TOTAL BEHAVIORAL SCIENCES	2045	7508	86.4	10.5	2.7	.4
ANTHROPOLOGY	265	1012	89.0	9.8	.3	.9
BIOLOGICAL & MEDICAL	45	166	90.7	6.2		3.1
CULTURAL & SOCIAL	195	747	90.6	8.4	.4	.5
OTHER	25	99	73.7	26.3		
PSYCHOLOGY	1286	4240	84.0	12.2	3.5	.3
COGNITIVE	72	253	86.8	11.2	2.0	
HUMAN DEVEL & GERONTOL	282	824	81.5	16.6	1.9	
HUMAN LEARNING & PERFORM	89	342	74.1	17.9	7.9	
NEUROBEHAVIORAL SCIENCES	65	173	92.5	6.9	.6	
PERCEPTUAL & SENSORY	50	190	83.2	8.9	6.3	1.6
PERSONALITY & EXPERMNTL	31	156	82.7	17.3		
PHYSIOL & COMPARATIVE	134	336	91.1	7.4	1.5	
PSYCHOLINGUISTICS	27	89	86.5	13.5		
PSYCHOPHYSICS & -METRICS	47	117	90.6	7.7	1.7	
SOCIAL	283	982	90.1	7.0	2.2	.6
OTHER	208	791	76.6	15.4	7.6	.5
SOCIOLOGY	268	1594	89.4	8.6	1.6	.4
COMPLEX ORGANIZ & PROF	47	313	90.1	9.9		
CRIMINOLOGY&DEVIANT BEH	41	215	95.8	1.9	2.3	
DEMOGRAPHY	23	106	94.3			5.7
MEDICAL	49	215	89.3	8.4	2.3	
OTHER	108	745	86.5	11.4	2.2	
OTHER BEHAVIORAL SCIENCES	226	662	91.1	5.0	3.5	.5
COMMUNICATIONS SCIENCES	101	290	90.0	5.2	3.8	1.0
ETHOLOGY & SOCIOBIOLOGY	33	112	100.0			
OTHER	92	260	88.4	7.0	4.7	
FY 1971 PHD'S	363	1492	88.7	10.1	1.0	.2
FY 1972 PHD'S	358	1523	88.3	8.8	2.6	.3
FY 1973 PHD'S	363	1373	86.5	10.4	2.8	.3
FY 1974 PHD'S	384	1554	84.0	12.7	2.3	.9
FY 1975 PHD'S	577	1569	84.7	10.4	4.6	.4
NIH/ADAMHA/HRA PREDOCS	798	2182	91.1	7.5	.5	.9
OTHER BEHAVIORAL PHD'S	1247	5326	84.5	11.7	3.6	.2
MALE	1447	5432	87.7	9.8	2.4	.1
FEMALE	598	2076	83.1	12.3	3.4	1.3

SOURCE: NRC, Survey of Biomedical and Behavioral Scientists, Washington, D.C., 1976.

APP. G5.2 IMPORTANCE OF DOCTORATE AS CREDENTIAL FOR ATTAINING PRESENT POSITION--NONACADEMIC

	F-T EMPLOYED		PERCENT WHO CONSIDER DEGREE			
PHD FIELD/YEAR/SUPPORT/SEX	SURVEY RESP	EST TOTAL	ESSENTIAL	HELPFUL	NOT NEEDED	UNCERTAIN
TOTAL BEHAVIORAL SCIENCES	600	2267	65.0	27.4	6.2	1.5
ANTHROPOLOGY	34	141	64.2	16.8	16.1	2.9
BIOLOGICAL & MEDICAL	3	13	53.8	46.2		
CULTURAL & SOCIAL	22	87	57.8	15.7	26.5	
OTHER	9	41	80.5	9.8		9.8
PSYCHOLOGY	426	1504	69.7	23.0	6.3	1.0
COGNITIVE	30	115	73.0	12.2	11.3	3.5
HUMAN DEVEL & GERONTOL	72	231	67.7	30.1	1.3	.9
HUMAN LEARNING & PERFORM	34	146	69.9	21.2	7.5	1.4
NEUROBEHAVIORAL SCIENCES	18	61	72.1	4.9	23.0	
PERCEPTUAL & SENSORY	11	33	45.5	24.2	30.3	
PERSONALITY & EXPERMNTL	12	63	82.5	17.5		
PHYSIOL & COMPARATIVE	43	120	83.3	14.2	2.5	
PSYCHOLINGUISTICS	4	11	81.8	18.2		
PSYCHOPHYSICS & -METRICS	28	49	69.4	20.4	4.1	6.1
SOCIAL	100	341	68.6	26.4	3.8	1.2
OTHER	74	334	65.3	26.9	7.8	
SOCIOLOGY	73	411	49.1	43.8	4.4	2.7
COMPLEX ORGANIZ & PROF	20	132	62.1	37.9		
CRIMINOLOGY&DEVIANT BEH	8	23	47.8	17.4	34.8	
DEMOGRAPHY	11	56	66.1	33.9		
MEDICAL	12	47	44.7	46.8	8.5	
OTHER	22	153	33.3	55.6	3.9	7.2
OTHER BEHAVIORAL SCIENCES	67	211	62.9	33.8	1.9	1.4
COMMUNICATIONS SCIENCES	31	94	72.3	20.2	4.3	3.2
ETHOLOGY & SOCIOBIOLOGY	6	28	57.1	42.9		
OTHER	30	89	54.5	45.5		
FY 1971 PHD'S	82	353	60.9	30.0	7.9	1.1
FY 1972 PHD'S	82	351	73.5	18.2	7.2	1.2
FY 1973 PHD'S	117	528	67.2	29.5	2.7	.6
FY 1974 PHD'S	125	517	57.8	31.1	8.3	2.7
FY 1975 PHD'S	194	518	67.0	25.8	5.6	1.6
NIH/ADAMHA/HRA PREDOCS	180	495	69.1	20.8	7.3	2.8
OTHER BEHAVIORAL PHD'S	420	1772	63.9	29.2	5.8	1.1
MALE	463	1790	65.1	26.2	7.1	1.6
FEMALE	137	477	64.6	31.9	2.7	.8

SOURCE: NRC, Survey of Biomedical and Behavioral Scientists, Washington, D.C., 1976.

APP. G6.1 MINIMUM LEVEL OF TRAINING NEEDED TO FULFILL PRESENT JOB REQUIREMENTS--ACADEMIC

PHD FIELD/YEAR/SUPPORT/SEX	F-T EMPLOYED SURVEY RESP	EST TOTAL	PERCENT WHO CONSIDER LEVEL NEEDED POST DOC	MD/ PHD	MS/MA	BS/BA	OTHER
TOTAL BEHAVIORAL SCIENCES	2044	7508	3.3	82.0	13.2	.8	.7
ANTHROPOLOGY	265	1012	1.6	89.2	7.6	1.0	.6
BIOLOGICAL & MEDICAL	46	166	2.4	95.8	1.8		
CULTURAL & SOCIAL	194	747	1.2	87.9	8.7	1.3	.8
OTHER	25	99	3.0	87.9	9.1		
PSYCHOLOGY	1283	4240	5.2	77.7	15.5	.8	.8
COGNITIVE	72	250	1.2	88.0	7.6		3.2
HUMAN DEVEL & GERONTCL	281	824	6.3	77.2	15.3	.5	.7
HUMAN LEARNING & PERFORM	99	342		72.5	23.7	2.9	.9
NEUROBEHAVIORAL SCIENCES	65	173	17.3	78.6	3.5		.6
PERCEPTUAL & SENSORY	49	190	9.1	68.4	20.3		2.1
PERSONALITY & EXPERMNTL	31	156	1.9	73.7	24.4		
PHYSIOL & COMPARATIVE	133	333	14.1	71.9	13.5		.6
PSYCHOLINGUISTICS	27	89	3.4	85.4	11.2		
PSYCHOPHYSICS & -METRICS	47	117	6.0	88.9	5.1		
SOCIAL	281	982	1.6	87.5	9.9	.7	.2
OTHER	207	781	5.5	67.8	24.5	1.4	.8
SOCIOLOGY	269	1594	.3	85.8	12.4	.4	1.1
COMPLEX ORGANIZ & PROF	47	313		90.1	7.7		2.2
CRIMINOLOGY&DEVIANT BEH	41	215		87.0	7.9		5.1
DEMOGRAPHY	23	106		94.3	5.7		
MEDICAL	49	215	2.3	82.3	15.3		
OTHER	109	745		83.4	15.8	.8	
OTHER BEHAVIORAL SCIENCES	227	662	.6	88.8	8.9	1.7	
COMMUNICATIONS SCIENCES	101	290	.7	88.3	11.0		
ETHOLOGY & SOCIOBIOLOGY	33	112		84.8	9.8	5.4	
OTHER	93	260	.8	91.2	6.2	1.9	
FY 1971 PHD'S	362	1492	4.9	85.3	8.5	.4	.9
FY 1972 PHD'S	359	1523	5.2	83.7	10.4	.3	.5
FY 1973 PHD'S	361	1370	2.6	82.0	12.8	1.5	1.0
FY 1974 PHD'S	384	1554	2.7	79.9	16.5	.2	.6
FY 1975 PHD'S	578	1569	1.0	79.0	17.6	1.7	.7
NIH/ADAMHA/HRA PREDOCS	796	2182	5.3	86.2	7.4	.1	.9
OTHER BEHAVIORAL PHD'S	1248	5326	2.4	80.2	15.6	1.1	.7
MALE	1447	5432	3.5	82.5	12.3	1.0	.8
FEMALE	597	2076	2.8	80.6	15.8	.1	.7

SOURCE: NRC, Survey of Biomedical and Behavioral Scientists, Washington, D.C., 1976.

APP. G6.2 MINIMUM LEVEL OF TRAINING NEEDED TO FULFILL PRESENT JOB REQUIREMENTS--NONACADEMIC

PHD FIELD/YEAR/SUPPORT/SEX	F-T EMPLOYED SURVEY RESP	EST TOTAL	PERCENT WHO CONSIDER LEVEL NEEDED POST DOC	MD/ PHD	MS/MA	BS/BA	OTHER
TOTAL BEHAVIORAL SCIENCES	585	2267	7.2	58.8	24.4	6.1	3.5
ANTHROPOLOGY	31	141	6.3	55.9	20.5	10.2	7.1
BIOLOGICAL & MEDICAL	3	13		100.0			
CULTURAL & SOCIAL	20	87	10.4	35.1	31.2	11.7	11.7
OTHER	8	41		83.8	5.4	10.8	
PSYCHOLOGY	416	1504	9.0	59.9	21.3	6.3	3.5
COGNITIVE	29	115	28.9	53.5	11.4	4.4	1.8
HUMAN DEVEL & GERONTOL	71	231	7.5	62.1	28.6	.9	.9
HUMAN LEARNING & PERFORM	32	146	4.5	63.6	18.9	12.9	
NEUROBEHAVIORAL SCIENCES	18	61	24.6	45.9	29.5		
PERCEPTUAL & SENSORY	10	33		50.0	6.7	33.3	10.0
PERSONALITY & EXPERMNTL	12	63	15.9	50.8	30.2	3.2	
PHYSIOL & COMPARATIVE	43	120	17.5	60.8	10.8	4.2	6.7
PSYCHOLINGUISTICS	4	11		81.8	18.2		
PSYCHOPHYSICS & -METRICS	28	49	4.1	71.4	12.2	12.2	
SOCIAL	96	341	4.2	63.3	19.1	9.1	4.2
OTHER	73	334	4.2	58.0	26.1	4.8	6.9
SOCIOLOGY	71	411	4.5	54.7	31.8	6.2	2.7
COMPLEX ORGANIZ & PROF	20	132		75.8	12.9	11.4	
CRIMINOLOGY&DEVIANT BEH	8	23		69.6	13.0	17.4	
DEMOGRAPHY	11	56		64.3	32.1	3.6	
MEDICAL	11	47	9.1	43.2	38.6	9.1	
OTHER	21	153	9.5	33.3	49.7		7.5
OTHER BEHAVIORAL SCIENCES	67	211	1.0	60.8	34.4	1.4	2.4
COMMUNICATIONS SCIENCES	30	94	2.2	66.3	23.9	3.3	4.3
ETHOLOGY & SOCIOBIOLOGY	6	28		100.0			
OTHER	31	89		42.7	56.2		1.1
FY 1971 PHD'S	79	353	4.7	57.3	27.8	6.4	3.8
FY 1972 PHD'S	81	351	6.7	65.7	18.6	3.5	5.5
FY 1973 PHD'S	114	528	10.2	60.3	19.5	6.2	3.9
FY 1974 PHD'S	124	517	10.1	53.6	26.7	8.3	1.4
FY 1975 PHD'S	187	518	3.4	58.8	29.0	5.2	3.6
NIH/ADAMHA/HRA PREDOCS	172	495	12.2	54.3	24.2	5.3	4.0
OTHER BEHAVIORAL PHD'S	413	1772	5.9	60.0	24.5	6.3	3.3
MALE	454	1790	6.8	59.0	23.7	6.7	3.8
FEMALE	131	477	8.9	58.0	27.2	3.7	2.2

SOURCE: NRC, Survey of Biomedical and Behavioral Scientists, Washington, D.C., 1976.

APP. G7.1 IMPORTANCE OF PREDOCTORAL RESEARCH EXPERIENCE TO PRESENT POSITION--ACADEMIC

	F-T EMPLOYED		PERCENT WHO CONSIDER EXPERIENCE			
PHD FIELD/YEAR/SUPPORT/SEX	SURVEY RESP	EST TOTAL	ESSEN TIAL	USE FUL	NOT USEFL	UNCER TAIN
TOTAL BEHAVIORAL SCIENCES	2023	7508	60.5	35.2	3.1	1.2
ANTHROPOLOGY	264	1012	74.5	20.4	3.0	2.2
BIOLOGICAL & MEDICAL	46	166	75.9	18.1		6.0
CULTURAL & SOCIAL	193	747	72.9	21.5	4.0	1.6
OTHER	25	99	83.8	16.2		
PSYCHOLOGY	1273	4240	61.2	33.5	4.2	1.1
COGNITIVE	72	250	77.2	20.8	2.0	
HUMAN DEVEL & GERONTOL	278	824	61.2	33.7	4.7	.4
HUMAN LEARNING & PERFORM	89	342	44.4	42.4	10.9	2.4
NEUROBEHAVIORAL SCIENCES	64	173	81.3	17.0	1.8	
PERCEPTUAL & SENSORY	50	190	58.4	40.5	1.1	
PERSONALITY & EXPERMNTL	31	156	54.5	39.7	3.8	1.9
PHYSIOL & COMPARATIVE	133	336	67.4	28.4	3.9	.3
PSYCHOLINGUISTICS	26	89	81.6	8.0	10.3	
PSYCHOPHYSICS & -METRICS	46	117	83.5	13.0	1.7	1.7
SOCIAL	280	982	66.9	29.2	2.0	1.9
OTHER	204	781	45.3	47.7	5.4	1.6
SOCIOLOGY	265	1594	52.7	45.2	1.2	1.0
COMPLEX ORGANIZ & PROF	46	313	44.3	53.1	1.3	1.3
CRIMINOLOGY&DEVIANT BEH	41	215	62.3	35.3		2.3
DEMOGRAPHY	22	106	57.8	42.2		
MEDICAL	48	215	50.7	49.3		
OTHER	108	745	53.2	44.0	2.0	.8
OTHER BEHAVIORAL SCIENCES	221	662	53.7	44.5	1.2	.6
COMMUNICATIONS SCIENCES	100	290	50.5	47.4	1.7	.3
ETHOLOGY & SOCIOBIOLOGY	32	112	64.2	33.0		2.8
OTHER	89	260	52.8	46.0	1.2	
FY 1971 PHD'S	361	1492	63.6	33.8	1.2	1.4
FY 1972 PHD'S	354	1523	59.4	35.8	4.1	.7
FY 1973 PHD'S	355	1370	60.5	34.7	3.3	1.4
FY 1974 PHD'S	378	1554	61.1	35.7	2.1	1.2
FY 1975 PHD'S	575	1569	58.1	35.7	4.9	1.3
NIH/ADAMHA/HRA PREDOCS	786	2182	73.2	24.1	2.0	.7
OTHER BEHAVIORAL PHD'S	1237	5326	55.4	39.7	3.6	1.4
MALE	1427	5432	60.6	35.6	3.0	.5
FEMALE	596	2076	60.3	33.9	3.5	2.3

SOURCE: NRC, Survey of Biomedical and Behavioral Scientists, Washington, D.C., 1976.

APP. G7.2 IMPORTANCE OF PREDOCTORAL RESEARCH EXPERIENCE TO PRESENT POSITION--NONACADEMIC

PHD FIELD/YEAR/SUPPORT/SEX	F-T EMPLOYED SURVEY RESP	F-T EMPLOYED EST TOTAL	PERCENT WHO CONSIDER EXPERIENCE ESSENTIAL	USEFUL	NOT USEFL	UNCERTAIN
TOTAL BEHAVIORAL SCIENCES	591	2267	47.5	44.7	6.7	1.1
ANTHROPOLOGY	33	141	65.4	27.8	6.8	
BIOLOGICAL & MEDICAL	3	13	69.2	30.8		
CULTURAL & SOCIAL	22	87	61.4	27.7	10.8	
OTHER	8	41	73.0	27.0		
PSYCHOLOGY	421	1504	43.6	48.6	6.9	.9
COGNITIVE	30	115	36.5	49.6	13.9	
HUMAN DEVEL & GERONTOL	71	231	30.1	61.5	4.9	3.5
HUMAN LEARNING & PERFORM	34	146	38.4	50.7	11.0	
NEUROBEHAVIORAL SCIENCES	17	61	62.7	37.3		
PERCEPTUAL & SENSORY	11	33	72.7	21.2	6.1	
PERSONALITY & EXPERMNTL	12	63	19.0	65.1	15.9	
PHYSIOL & COMPARATIVE	42	120	52.5	47.5		
PSYCHOLINGUISTICS	4	11	81.8		18.2	
PSYCHOPHYSICS & -METRICS	28	49	61.2	36.7	2.0	
SOCIAL	99	341	48.1	45.4	5.9	.6
OTHER	73	334	44.2	47.0	7.6	1.2
SOCIOLOGY	71	411	59.5	33.1	6.4	1.0
COMPLEX ORGANIZ & PROF	20	132	76.5	23.5		
CRIMINOLOGY&DEVIANT BEH	8	23	43.5	56.5		
DEMOGRAPHY	9	56	58.0	42.0		
MEDICAL	12	47	48.9	42.6		8.5
OTHER	22	153	51.0	32.0	17.0	
OTHER BEHAVIORAL SCIENCES	66	211	40.3	51.0	5.3	3.4
COMMUNICATIONS SCIENCES	31	94	31.9	52.1	10.6	5.3
ETHOLOGY & SOCIOBIOLOGY	6	28	100.0			
OTHER	29	89	29.8	66.7	1.2	2.4
FY 1971 PHD'S	80	353	40.2	49.1	9.2	1.4
FY 1972 PHD'S	82	351	42.1	49.0	7.2	1.7
FY 1973 PHD'S	113	528	47.5	45.7	6.4	.4
FY 1974 PHD'S	125	517	52.4	39.7	7.9	
FY 1975 PHD'S	191	518	51.1	43.0	3.6	2.4
NIH/ADAMHA/HRA PREDOCS	177	495	57.0	38.1	3.7	1.2
OTHER BEHAVIORAL PHD'S	414	1772	44.8	46.6	7.5	1.1
MALE	456	1790	46.0	46.3	6.7	1.0
FEMALE	135	477	53.0	38.7	6.6	1.7

SOURCE: NRC, Survey of Biomedical and Behavioral Scientists, Washington, D.C., 1976.

APP. GR.1 OVERALL RELEVANCE OF DOCTORAL DEGREE, TRAINING, AND RESEARCH EXPERIENCE TO PRESENT EMPLOYMENT SITUATION--ACADEMIC

PHD FIELD/YEAR/SUPPORT/SEX	LABOR FORCE		PERCENT WHO CONSIDER PHD		
	SURVEY RESP	EST TOTAL	ESSENTIAL	USEFUL	NOT USED
TOTAL BEHAVIORAL SCIENCES	2134	7809	89.8	7.9	2.3
ANTHROPOLOGY	280	1065	94.2	2.9	2.9
BIOLOGICAL & MEDICAL	47	172	100.0		
CULTURAL & SOCIAL	208	794	92.2	3.9	3.9
OTHER	25	99	100.0		
PSYCHOLOGY	1344	4418	86.8	10.5	2.7
COGNITIVE	76	275	88.0	9.1	2.9
HUMAN DEVEL & GERONTOL	296	866	86.3	12.0	1.7
HUMAN LEARNING & PERFORM	94	354	78.0	19.8	2.3
NEUROBEHAVIORAL SCIENCES	66	175	97.7	.6	1.7
PERCEPTUAL & SENSORY	52	201	82.6	13.9	3.5
PERSONALITY & EXPERMNTL	34	163	83.4	13.5	3.1
PHYSIOL & COMPARATIVE	142	357	90.5	4.8	4.8
PSYCHOLINGUISTICS	30	97	83.5	13.4	3.1
PSYCHOPHYSICS & -METRICS	47	117	96.6	3.4	
SOCIAL	293	1014	92.3	5.6	2.1
OTHER	214	799	80.4	15.6	4.0
SOCIOLOGY	275	1635	94.3	4.6	1.2
COMPLEX ORGANIZ & PROF	48	316	97.8	2.2	
CRIMINOLOGY&DEVIANT BEH	42	218	96.3	2.3	1.4
DEMOGRAPHY	24	117	96.6	3.4	
MEDICAL	50	218	95.0	5.0	
OTHER	111	766	91.6	6.3	2.1
OTHER BEHAVIORAL SCIENCES	235	691	91.5	6.8	1.7
COMMUNICATIONS SCIENCES	105	305	89.2	10.2	.7
ETHOLOGY & SOCIOBIOLOGY	34	114	98.2		1.8
OTHER	96	272	91.2	5.9	2.9
FY 1971 PHD'S	377	1549	91.2	6.8	1.9
FY 1972 PHD'S	377	1596	90.4	7.6	2.1
FY 1973 PHD'S	379	1427	90.0	7.4	2.7
FY 1974 PHD'S	400	1619	89.4	8.5	2.1
FY 1975 PHD'S	601	1618	87.9	9.3	2.8
NIH/ADAMHA/HRA PREDOCS	826	2259	93.2	5.4	1.4
OTHER BEHAVIORAL PHD'S	1308	5550	88.3	9.0	2.7
MALE	1475	5511	91.8	6.7	1.5
FEMALE	659	2298	84.8	10.8	4.4

SOURCE: NRC, Survey of Biomedical and Behavioral Scientists, Washington, D.C., 1976.

APP. G8.2 OVERALL RELEVANCE OF DOCTORAL DEGREE, TRAINING, AND RESEARCH EXPERIENCE TO PRESENT EMPLOYMENT SITUATION--NONACADEMIC

	LABOR FORCE		PERCENT WHO CONSIDER PHD		
PHD FIELD/YEAR/SUPPORT/SEX	SURVEY RESP	EST TOTAL	ESSEN TIAL	USE FUL	NOT USED
TOTAL BEHAVIORAL SCIENCES	648	2421	77.5	18.1	4.4
ANTHROPOLOGY	41	164	81.9	7.5	10.6
BIOLOGICAL & MEDICAL	3	13	100.0		
CULTURAL & SOCIAL	27	104	75.0	8.0	17.0
OTHER	11	47	91.5	8.5	
PSYCHOLOGY	458	1593	80.4	16.3	3.3
COGNITIVE	32	124	83.9	9.7	6.5
HUMAN DEVEL & GERONTOL	81	252	89.1	8.5	2.4
HUMAN LEARNING & PERFORM	36	151	80.1	13.9	6.0
NEUROBEHAVIORAL SCIENCES	20	75	65.3	34.7	
PERCEPTUAL & SENSORY	11	33	72.7	27.3	
PERSONALITY & EXPERMNTL	12	63	82.5	17.5	
PHYSIOL & COMPARATIVE	47	129	86.8	13.2	
PSYCHOLINGUISTICS	5	12	83.3	16.7	
PSYCHOPHYSICS & -METRICS	28	49	85.7	12.2	2.0
SOCIAL	106	352	77.0	20.2	2.8
OTHER	80	353	76.8	17.8	5.4
SOCIOLOGY	78	439	68.6	24.6	6.8
COMPLEX ORGANIZ & PROF	22	152	72.4	14.5	13.2
CRIMINOLOGY&DEVIANT BEH	8	23	82.6	17.4	
DEMOGRAPHY	12	60	75.0	18.3	6.7
MEDICAL	13	49	51.0	40.8	8.2
OTHER	23	155	65.8	32.9	1.3
OTHER BEHAVIORAL SCIENCES	71	225	71.6	25.8	2.7
COMMUNICATIONS SCIENCES	32	99	80.8	19.2	
ETHOLOGY & SOCIOBIOLOGY	8	37	75.7	8.1	16.2
OTHER	31	89	59.6	40.4	
FY 1971 PHD'S	92	393	72.5	23.4	4.1
FY 1972 PHD'S	88	364	81.9	13.1	5.0
FY 1973 PHD'S	121	538	79.9	18.4	1.7
FY 1974 PHD'S	140	584	73.5	17.4	9.1
FY 1975 PHD'S	207	542	80.0	18.1	1.9
NIH/ADAMHA/HRA PREDOCS	203	560	76.1	18.6	5.4
OTHER BEHAVIORAL PHD'S	445	1861	77.9	18.0	4.1
MALE	483	1863	76.9	17.9	5.2
FEMALE	165	558	79.6	18.8	1.6

SOURCE: NRC, Survey of Biomedical and Behavioral Scientists, Washington, D.C., 1976.

APP. G9.1 REASON FOR TAKING POSTDOCTORAL APPOINTMENT WITHIN A YEAR AFTER EARNING DOCTORATE--ACADEMIC

PHD FIELD/YEAR/SUPPORT/SEX	ALL PHD'S SURVEY RESP	ALL PHD'S EST TOTAL	PERCENT WHO HELD APPT	HELD POSTDOC SURVEY RESP	HELD POSTDOC EST TOTAL	PERCENT TAKING APPT FOR RES EXPER	FIELD SWTCH	NO EMPL	OTHER REASON
TOTAL BEHAVIORAL SCIENCES	2267	8130	12.8	353	1042	46.2	13.9	21.7	18.1
ANTHROPOLOGY	288	1087	8.0	22	87	43.7	20.7	25.3	10.3
BIOLOGICAL & MEDICAL	48	175	5.1	3	9	66.7			33.3
CULTURAL & SOCIAL	215	813	8.9	18	72	36.1	25.0	30.6	8.3
OTHER	25	99	6.1	1	6	100.0			
PSYCHOLOGY	1459	4690	17.3	293	812	46.3	15.4	18.9	19.5
COGNITIVE	81	298	12.8	13	38	71.1	13.2	7.9	7.9
HUMAN DEVEL & GERONTOL	310	895	12.2	40	109	34.9	20.2	12.8	32.1
HUMAN LEARNING & PERFORM	97	364	8.2	9	30	66.7	16.7	16.7	
NEUROBEHAVIORAL SCIENCES	84	207	46.4	40	96	50.0	5.3	33.0	11.7
PERCEPTUAL & SENSORY	58	213	20.7	16	44	47.7	20.5	13.6	18.2
PERSONALITY & EXPERMNTL	34	163	14.1	5	23	57.1	28.6	14.3	
PHYSIOL & COMPARATIVE	185	448	47.3	96	212	56.2	15.2	19.0	9.5
PSYCHOLINGUISTICS	33	104	19.2	8	20	80.0	10.0		10.0
PSYCHOPHYSICS & -METRICS	49	124	22.6	6	28	3.6	7.1		89.3
SOCIAL	302	1034	8.1	24	84	39.3	3.6	8.3	48.8
OTHER	226	840	15.2	36	128	31.3	25.8	33.6	9.4
SOCIOLOGY	278	1043	4.3	11	70	31.4		47.1	21.4
COMPLEX ORGANIZ & PROF	48	316	11.7	3	37	29.7		70.3	
CRIMINOLOGY&DEVIANT BEH	43	222	4.1	2	9	44.4			55.6
DEMOGRAPHY	25	118	5.9	2	7	42.9		57.1	
MEDICAL	50	218	6.0	3	13	30.8		23.1	46.2
OTHER	112	769	.5	1	4				100.0
OTHER BEHAVIORAL SCIENCES	242	710	10.3	27	73	63.0	2.7	24.7	9.6
COMMUNICATIONS SCIENCES	107	309	7.4	9	23	87.0		13.0	
ETHOLOGY & SOCIOBIOLOGY	35	121	20.7	7	25	56.0		44.0	
OTHER	100	280	8.9	11	25	48.0	8.0	16.0	28.0
FY 1971 PHD'S	383	1570	14.0	65	220	51.8	10.0	18.6	19.5
FY 1972 PHD'S	380	1605	11.7	51	188	42.0	23.9	17.0	17.0
FY 1973 PHD'S	389	1456	11.1	49	162	48.1	9.4	24.4	18.1
FY 1974 PHD'S	430	1708	12.6	70	215	38.5	22.5	23.9	15.0
FY 1975 PHD'S	685	1791	14.3	118	257	49.8	5.5	24.3	20.4
NIH/ADAMHA/HRA PREDOCS	895	2402	18.1	189	435	51.5	11.7	25.5	11.3
OTHER BEHAVIORAL PHD'S	1372	5728	10.6	164	607	42.4	15.5	19.0	23.1
MALE	1548	5680	12.1	237	685	49.3	14.1	23.5	13.1
FEMALE	719	2450	14.6	116	357	40.3	13.5	18.3	27.9

SOURCE: NRC, Survey of Biomedical and Behavioral Scientists, Washington, D.C., 1976.

APP. G9.2 REASON FOR TAKING POSTDOCTORAL APPOINTMENT WITHIN A YEAR AFTER EARNING DOCTORATE--NONACADEMIC

	ALL PHD'S		PERCENT WHO HELD APPT	HELD POSTDOC		PERCENT TAKING APPT FOR			
PHD FIELD/YEAR/SUPPORT/SEX	SURVEY RESP	EST TOTAL		SURVEY RESP	EST TOTAL	RES EXPER	FIELD SWTCH	NO EMPL	OTHER REASON
TOTAL BEHAVIORAL SCIENCES	675	2498	12.8	93	319	43.7	12.9	17.2	26.2
ANTHROPOLOGY	44	168	8.9	5	15	40.0	13.3	13.3	33.3
BIOLOGICAL & MEDICAL	3	13	46.2	1	6	100.0			
CULTURAL & SOCIAL	30	108	8.3	4	9		22.2	22.2	55.6
OTHER	11	47							
PSYCHOLOGY	479	1652	15.7	79	259	38.6	15.3	18.1	28.1
COGNITIVE	32	124	22.6	3	28			44.4	55.6
HUMAN DEVEL & GERONTOL	89	270	11.9	13	32	28.1	12.5	12.5	46.9
HUMAN LEARNING & PERFORM	37	157	14.0	3	22	72.7		27.3	
NEUROBEHAVIORAL SCIENCES	22	87	44.8	13	39	71.8		12.8	15.4
PERCEPTUAL & SENSORY	11	33	21.2	2	7			100.0	
PERSONALITY & EXPERMNTL	12	63	15.9	2	10		10.0		90.0
PHYSIOL & COMPARATIVE	51	138	34.1	19	47	55.3	23.4	6.4	14.9
PSYCHOLINGUISTICS	5	12							
PSYCHOPHYSICS & -METRICS	29	50	12.0	3	6	33.3		50.0	16.7
SOCIAL	107	354	6.5	9	23	17.4	30.4	17.4	34.8
OTHER	84	364	12.4	12	45	24.4	33.3	11.1	31.1
SOCIOLOGY	80	451	4.2	4	19	68.4			31.6
COMPLEX ORGANIZ & PROF	22	152	8.6	2	13	69.2			30.8
CRIMINOLOGY&DEVIANT BEH	8	23							
DEMOGRAPHY	14	72	2.8	1	2				100.0
MEDICAL	13	49	8.2	1	4	100.0			
OTHER	23	155							
OTHER BEHAVIORAL SCIENCES	72	227	11.5	5	26	76.9		23.1	
COMMUNICATIONS SCIENCES	32	99	2.0	1	2	100.0			
ETHOLOGY & SOCIOBIOLOGY	8	37	64.9	4	24	75.0		25.0	
OTHER	32	91							
FY 1971 PHD'S	96	411	14.1	14	58	60.3	19.0		20.7
FY 1972 PHD'S	93	381	16.5	17	63	30.2	25.4	6.3	38.1
FY 1973 PHD'S	121	538	14.9	18	80	65.7		20.0	14.3
FY 1974 PHD'S	144	599	10.4	17	62	32.3	8.1	33.9	25.8
FY 1975 PHD'S	221	569	9.8	27	56	26.8	14.3	25.0	33.9
NIH/ADAMHA/HRA PREDOCS	213	581	22.2	45	129	43.4	14.7	17.8	24.0
OTHER BEHAVIORAL PHD'S	462	1917	9.9	48	190	43.9	11.7	16.7	27.8
MALE	503	1930	12.1	66	234	48.2	12.9	19.2	19.6
FEMALE	172	568	15.0	27	85	31.8	12.9	11.8	43.5

SOURCE: NRC, Survey of Biomedical and Behavioral Scientists, Washington, D.C., 1976.

APP. C10.1 RELEVANCE OF CURRENT EMPLOYMENT FIELD TO DOCTORATE FIELD--ACADEMIC

	ALL EMPLOYED		PERCENT EMPLOYED IN			PERCENT INDICATING FIELDS RELATED		
PHD FIELD/YEAR/SUPPORT/SEX	SURVEY RESP	EST TOTAL	PHD SPCLTY FIELD	PHD BROAD FIELD	OTHER FIELD	CLOSE LY	SOME WHAT	NOT AT ALL
TOTAL BEHAVIORAL SCIENCES	2248	8130	66.4	24.9	8.8	74.0	23.4	2.6
ANTHROPOLOGY	287	1087	82.0	11.9	6.1	83.1	14.9	2.0
BIOLOGICAL & MEDICAL	48	175	67.4	17.1	15.4	82.3	14.3	3.4
CULTURAL & SOCIAL	214	813	87.3	8.9	3.8	82.7	15.9	1.4
OTHER	25	99	64.6	27.3	8.1	87.9	8.1	4.0
PSYCHOLOGY	1445	4690	61.2	29.0	9.8	72.5	25.5	2.0
COGNITIVE	80	298	55.6	35.9	8.5	81.5	18.5	
HUMAN DEVEL & GERONTOL	307	895	70.5	19.4	10.1	80.2	18.5	1.2
HUMAN LEARNING & PERFORM	96	364	41.1	42.5	16.5	58.0	41.2	.8
NEUROBEHAVIORAL SCIENCES	83	207	63.9	13.2	22.9	80.0	18.5	1.5
PERCEPTUAL & SENSORY	57	213	62.4	27.6	10.0	63.8	34.3	1.9
PERSONALITY & EXPERMNTL	34	163	45.4	52.8	1.8	75.8	22.4	1.9
PHYSIOL & COMPARATIVE	184	448	51.5	34.2	14.3	71.9	25.8	2.2
PSYCHOLINGUISTICS	31	104	71.7	28.3		78.8	19.2	1.9
PSYCHOPHYSICS & -METRICS	48	124	52.8	40.7	6.5	61.5	36.9	1.6
SOCIAL	301	1034	70.4	26.0	3.6	74.5	24.3	1.2
OTHER	224	840	58.1	29.6	12.3	65.6	29.1	5.3
SOCIOLOGY	275	1643	65.4	28.8	5.8	68.3	28.1	3.5
COMPLEX ORGANIZ & PROF	47	316	57.7	31.4	10.9	53.7	44.6	1.7
CRIMINOLOGY&DEVIANT BEH	43	222	83.8	9.5	6.8	84.0	16.0	
DEMOGRAPHY	24	118	90.4	7.0	2.6	79.7	16.9	3.4
MEDICAL	50	218	55.5	33.0	11.5	51.4	39.9	8.7
OTHER	111	769	62.3	35.5	2.3	72.6	23.6	3.8
OTHER BEHAVIORAL SCIENCES	241	710	78.4	8.6	13.0	83.3	11.7	5.0
COMMUNICATIONS SCIENCES	106	309	86.9	2.6	10.5	90.0	7.3	2.7
ETHOLOGY & SOCIOBIOLOGY	35	121	54.5	18.2	27.3	53.7	28.1	18.2
OTHER	100	280	79.3	11.1	9.6	88.8	9.4	1.8
FY 1971 PHD'S	376	1570	63.5	25.6	10.9	71.6	25.4	3.0
FY 1972 PHD'S	376	1605	65.7	26.2	8.1	74.0	24.4	1.6
FY 1973 PHD'S	387	1456	67.2	23.7	9.1	74.8	21.7	3.4
FY 1974 PHD'S	427	1708	65.5	26.7	7.8	74.8	22.6	2.6
FY 1975 PHD'S	692	1791	69.6	22.2	8.2	74.6	23.1	2.4
NIH/ADAMHA/HRA PREDOCS	892	2402	68.0	23.9	8.1	78.0	19.9	2.1
OTHER BEHAVIORAL PHD'S	1356	5728	65.7	25.2	9.1	72.3	24.9	2.8
MALE	1537	5680	67.5	24.1	8.4	74.5	23.0	2.5
FEMALE	711	2450	63.7	26.6	9.7	72.8	24.5	2.7

SOURCE: NRC, Survey of Biomedical and Behavioral Scientists, Washington, D.C., 1976.

APP. G10.2 RELEVANCE OF CURRENT EMPLOYMENT FIELD TO DOCTORATE FIELD--NONACADEMIC

	ALL EMPLOYED		PERCENT EMPLOYED IN			PERCENT INDICATING FIELDS RELATED		
PHD FIELD/YEAR/SUPPORT/SEX	SURVEY RESP	EST TOTAL	PHD SPCLTY FIELD	PHD BROAD FIELD	OTHER FIELD	CLOSE LY	SOME WHAT	NOT AT ALL
TOTAL BEHAVIORAL SCIENCES	632	2498	39.4	46.7	13.9	57.1	36.6	6.4
ANTHROPOLOGY	34	168	67.2	19.4	13.4	63.9	29.5	6.6
BIOLOGICAL & MEDICAL	3	13	100.0			69.2	30.8	
CULTURAL & SOCIAL	20	108	51.4	24.3	24.3	54.7	34.9	10.4
OTHER	11	47	83.0	17.0		83.0	17.0	
PSYCHOLOGY	456	1652	32.8	54.5	12.7	53.6	38.4	8.0
COGNITIVE	30	124	16.4	61.8	21.8	42.0	25.2	32.8
HUMAN DEVEL & GERONTOL	83	270	24.9	69.6	5.4	59.0	36.6	4.5
HUMAN LEARNING & PERFORM	37	157	31.8	55.4	12.7	50.3	45.0	4.6
NEUROBEHAVIORAL SCIENCES	21	87	28.6	64.3	7.1	50.6	33.3	16.1
PERCEPTUAL & SENSORY	10	33	46.7	46.7	6.7	38.7	38.7	22.6
PERSONALITY & EXPERMNTL	12	63		73.0	27.0	47.6	44.4	7.9
PHYSIOL & COMPARATIVE	48	138	8.6	64.8	26.6	31.9	51.4	16.7
PSYCHOLINGUISTICS	4	12	30.0	70.0		75.0	8.3	16.7
PSYCHOPHYSICS & -METRICS	29	50	44.0	36.0	20.0	56.0	42.0	2.0
SOCIAL	102	354	30.0	54.1	15.9	52.0	43.8	4.3
OTHER	80	364	60.1	34.2	5.7	66.9	31.7	1.4
SOCIOLOGY	74	451	39.6	44.5	16.0	56.6	41.6	1.8
COMPLEX ORGANIZ & PROF	19	152	30.4	49.6	20.0	47.4	52.6	
CRIMINOLOGY&DEVIANT BEH	8	23	78.3		21.7	78.9		21.1
DEMOGRAPHY	13	72	77.4	21.0	1.6	52.8	47.2	
MEDICAL	13	49	65.3	4.1	30.6	79.6	12.2	8.2
OTHER	21	155	15.9	71.7	12.3	57.4	42.6	
OTHER BEHAVIORAL SCIENCES	68	227	70.3	10.5	19.1	78.0	18.5	3.5
COMMUNICATIONS SCIENCES	31	99	82.5	5.2	12.4	80.8	17.2	2.0
ETHOLOGY & SOCIOBIOLOGY	7	37	7.4	29.6	63.0	48.6	35.1	16.2
OTHER	30	91	76.5	10.6	12.9	86.8	13.2	
FY 1971 PHD'S	90	411	44.2	42.2	13.6	54.3	40.1	5.6
FY 1972 PHD'S	83	301	36.9	43.5	19.6	50.1	41.6	8.2
FY 1973 PHD'S	116	538	45.2	43.8	11.0	55.5	38.2	6.4
FY 1974 PHD'S	135	599	33.2	53.9	12.9	61.1	31.3	7.7
FY 1975 PHD'S	208	569	38.2	47.5	14.3	61.1	34.6	4.3
NIH/ADAMHA/HRA PREDOCS	192	581	40.2	44.4	15.4	52.2	39.2	8.6
OTHER BEHAVIORAL PHD'S	440	1917	39.1	47.4	13.5	58.6	35.7	5.7
MALE	470	1930	40.2	44.3	15.5	56.2	36.7	7.0
FEMALE	162	568	36.5	54.9	8.6	59.9	36.0	4.1

SOURCE: NRC, Survey of Biomedical and Behavioral Scientists, Washington, D.C., 1976.

APP. G11.1 PRIMARY SOURCES OF SUPPORT IN FIRST AND SECOND YEARS OF GRADUATE SCHOOL--ACADEMIC

	ALL PHD'S		PERCENT SUPPORTED IN FIRST YEAR BY						PERCENT SUPPORTED IN SECOND YEAR BY					
			--TRG/FELL--		FEDL				--TRG/FELL--		FEDL			
PHD FIELD/YEAR/SUPPORT/SEX	SURVEY RESP	EST TOTAL	NIH/ ADAMHA	OTHER FEDL	RES GRANT	UNIV OR STATE	PERSONAL	OTHER/ UNKNOWN	NIH/ ADAMHA	OTHER FEDL	RES GRANT	UNIV OR STATE	PERSONAL	OTHER/ UNKNOWN
TOTAL BEHAVIORAL SCIENCES	2250	8130	13.6	17.4	6.6	33.4	22.6	6.3	16.8	20.7	7.0	36.[illegible]	14.4	5.1
ANTHROPOLOGY	286	1087	9.7	18.4	3.1	26.8	37.1	4.9	16.1	22.7	2.6	38.5	17.4	2.8
BIOLOGICAL & MEDICAL	47	175	14.5	8.1	2.3	39.5	33.1	2.3	16.3	7.6	2.3	51.7	15.1	7.0
CULTURAL & SOCIAL	214	813	9.9	19.1	2.8	24.3	38.8	5.1	17.4	24.2	3.0	35.8	17.9	1.7
OTHER	25	99		30.3	6.1	25.3	30.3	8.1	5.1	36.4		37.4	17.2	4.0
PSYCHOLOGY	1450	4690	15.1	18.0	8.0	32.7	20.3	6.0	17.9	20.5	9.3	32.8	14.5	5.[illegible]
COGNITIVE	79	298	13.0	26.6	13.3	34.5	9.9	2.7	19.9	27.0	7.1	33.8	7.4	4.7
HUMAN DEVEL & GERONTOL	309	895	15.8	17.0	5.3	27.3	28.0	6.6	20.7	20.6	7.1	25.6	22.6	3.4
HUMAN LEARNING & PERFORM	97	364	14.3	11.8	19.0	23.1	26.4	5.5	17.9	16.8	12.4	25.8	19.0	8.2
NEUROBEHAVIORAL SCIENCES	84	257	24.2	16.9	8.2	32.9	12.6	5.3	29.0	21.7	11.1	29.0	6.8	2.4
PERCEPTUAL & SENSORY	57	213	15.6	18.5	11.4	41.7	10.4	2.4	17.1	26.1	19.4	28.0	5.2	4.3
PERSONALITY & EXPERMNTL	34	163	17.2	6.7		37.4	28.2	10.4	12.3	6.7	6.1	41.7	22.7	10.4
PHYSIOL & COMPARATIVE	184	448	24.3	13.4	11.8	34.0	11.3	5.2	27.0	16.3	13.4	34.2	6.3	2.7
PSYCHOLINGUISTICS	33	104	9.6	25.0	1.9	25.0	20.2	18.3	16.3	33.7	8.7	19.2	9.6	12.5
PSYCHOPHYSICS & -METRICS	49	124	7.3	18.5	16.9	25.8	14.5	16.9	9.1	22.6	18.5	37.1	10.5	7.3
SOCIAL	301	1034	14.2	19.7	4.6	39.8	16.8	4.8	15.7	22.2	5.8	40.1	11.2	5.0
OTHER	223	840	10.5	20.2	6.4	31.4	25.9	5.6	12.2	18.7	9.8	35.4	18.7	5.2
SOCIOLOGY	274	1643	12.6	12.1	6.2	39.3	21.7	8.1	15.0	17.0	3.9	43.7	12.7	7.7
COMPLEX ORGANIZ & PROF	47	316	7.7	4.2	4.8	44.2	23.2	15.8	10.6	13.9	2.9	40.6	18.7	13.2
CRIMINOLOGY&DEVIANT BEH	43	222	3.6	9.9	9.5	29.7	43.7	3.6	6.9	20.3	9.7	35.0	24.4	3.7
DEMOGRAPHY	25	118	16.1	17.8	3.4	36.4	7.6	18.6	22.0	17.8	3.4	36.4	4.2	16.1
MEDICAL	50	218	30.7	21.1	2.8	22.9	15.1	7.3	30.2	23.3		36.7	1.9	7.9
OTHER	109	769	11.4	12.5	7.3	45.4	18.7	4.7	13.6	15.5	3.7	50.7	11.2	5.2
OTHER BEHAVIORAL SCIENCES	240	710	12.7	24.1	3.9	35.1	17.9	6.3	15.3	27.2	5.5	35.9	12.8	3.3
COMMUNICATIONS SCIENCES	105	309	11.0	27.4	4.3	33.1	20.7	3.3	14.8	31.6	4.6	30.9	13.2	4.9
ETHOLOGY & SOCIOBIOLOGY	35	121	2.5	12.4	5.8	58.7	4.1	16.5	8.3	12.4	8.3	66.9	4.1	
OTHER	100	280	18.9	25.7	2.5	27.1	20.7	5.0	18.9	28.9	5.4	27.9	16.1	2.9
FY 1971 PHD'S	378	1570	13.6	16.9	7.1	34.2	20.8	7.4	20.0	19.8	9.3	30.5	13.[illegible]	7.4
FY 1972 PHD'S	375	1605	10.8	18.9	6.5	35.0	23.5	5.3	14.6	23.7	7.1	36.0	15.2	3.4
FY 1973 PHD'S	386	1456	15.3	16.8	5.9	32.1	24.0	6.0	18.4	20.6	5.6	35.9	14.9	4.6
FY 1974 PHD'S	428	1708	13.1	19.1	5.7	32.5	23.2	6.4	15.4	21.3	5.4	39.5	13.4	4.5
FY 1975 PHD'S	683	1791	15.4	15.3	7.7	33.4	21.9	6.3	16.2	18.2	7.5	37.1	15.4	5.5
NIH/ADAMHA/HRA PREDOCS	892	2402	46.0	10.5	3.9	24.6	10.8	4.3	56.6	11.8	3.4	23.4	2.3	2.2
OTHER BEHAVIORAL PHD'S	1358	5728		20.3	7.8	37.2	27.6	7.1		24.4	8.5	41.3	19.4	6.3
MALE	1539	5680	13.6	17.4	7.3	33.3	22.6	5.7	15.6	20.5	8.0	36.7	14.4	4.9
FEMALE	711	2450	13.7	17.3	5.0	33.8	22.7	7.6	19.9	21.1	4.6	34.5	14.4	5.6

SOURCE: NRC, Survey of Biomedical and Behavioral Scientists, Washington, D.C., 1976.

APP. G11.2 PRIMARY SOURCES OF SUPPORT IN FIRST AND SECOND YEARS OF GRADUATE SCHOOL--NONACADEMIC

	ALL PHD'S		PERCENT SUPPORTED IN FIRST YEAR BY						PERCENT SUPPORTED IN SECOND YEAR BY					
			--TRG/FELL--		FEDL	UNIV			--TRG/FELL--		FEDL	UNIV		
PHD FIELD/YEAR/SUPPORT/SEX	SURVEY RESP	EST TOTAL	NIH/ ADAMHA	OTHER FEDL	RES GRANT	OR STATE	PER SONAL	OTHER/ UNKNOWN	NIH/ ADAMHA	OTHER FEDL	RES GRANT	OR STATE	PER SONAL	OTHER/ UNKNOWN
TOTAL BEHAVIORAL SCIENCES	670	2498	12.0	14.5	6.9	30.7	30.2	5.7	14.4	19.2	8.9	30.5	21.1	5.9
ANTHROPOLOGY	42	168	17.3	9.3		25.3	41.4	6.8	23.5	11.1	2.5	27.8	32.1	3.1
BIOLOGICAL & MEDICAL	3	13	46.2			30.8		23.1	46.2			30.8		23.1
CULTURAL & SOCIAL	29	108	21.2	11.5		26.0	39.4	1.9	30.8	14.4		20.2	32.7	1.9
OTHER	10	47		6.7		22.2	57.8	13.3		6.7	8.9	44.4	40.0	
PSYCHOLOGY	476	1652	11.4	14.4	7.6	31.5	30.1	5.2	13.4	19.9	9.3	31.4	20.9	5.0
COGNITIVE	32	124	9.7	21.0	13.7	29.8	21.0	4.8	3.2	25.8	14.5	26.6	16.9	12.9
HUMAN DEVEL & GERONTOL	87	270	13.5	5.2	7.5	27.7	43.8	2.2	13.8	12.3	7.1	33.6	29.9	3.4
HUMAN LEARNING & PERFORM	37	157	3.2	12.1	12.7	46.5	25.5		5.7	26.8	10.2	41.4	15.9	
NEUROBEHAVIORAL SCIENCES	22	87	19.5	32.2	8.0	26.4	6.9	6.9	35.6	32.2	14.9	3.4	3.4	10.3
PERCEPTUAL & SENSORY	11	33	15.2	18.2	18.2	48.5			9.1	48.5	21.2	21.2		
PERSONALITY & EXPERMNTL	12	63	9.5	14.3	6.3	22.2	47.6		1.6	14.3	6.3	33.3	30.2	14.3
PHYSIOL & COMPARATIVE	51	138	23.9	26.8	10.9	23.2	11.6	3.6	26.8	29.7	8.0	29.7	3.6	2.2
PSYCHOLINGUISTICS	5	12	25.0			66.7	8.3		33.3			66.7		
PSYCHOPHYSICS & -METRICS	29	50	20.0	12.0	4.0	34.0	30.0		16.0	14.0	12.0	28.0	28.0	2.0
SOCIAL	106	354	9.9	17.3	6.5	28.4	30.4	7.4	15.6	22.2	10.2	25.6	22.4	4.0
OTHER	84	364	6.9	8.5	3.0	34.1	37.6	9.9	8.6	11.6	6.4	40.2	27.1	6.1
SOCIOLOGY	80	451	14.0	10.9	6.0	34.1	27.7	7.3	16.2	15.5	7.1	32.6	20.6	8.0
COMPLEX ORGANIZ & PROF	22	152	5.9	5.9	5.9	44.7	37.5		11.8	19.7	14.5	32.2	14.5	7.2
CRIMINOLOGY&DEVIANT BEH	8	23	8.7	26.1	8.7	34.8	4.3	17.4	30.4	17.4		39.1	13.0	
DEMOGRAPHY	14	72	25.0	4.2	13.9	27.8	2.8	26.4	9.7	6.9		41.7	15.3	26.4
MEDICAL	13	49	38.8	22.4		12.2	26.5		38.8		8.2	4.1	49.0	
OTHER	23	155	9.7	12.9	3.9	33.5	33.5	6.5	14.2	20.0	3.9	36.8	21.3	3.9
OTHER BEHAVIORAL SCIENCES	72	227	8.8	26.4	8.4	22.5	28.6	5.3	11.5	27.3	13.7	22.0	15.9	9.7
COMMUNICATIONS SCIENCES	32	99	11.1	30.3	6.1	9.1	35.4	8.1	13.1	31.3	11.1	29.3	12.1	3.0
ETHOLOGY & SOCIOBIOLOGY	8	37	5.4	10.8	16.2	67.6			21.6	10.8	24.3	16.2		27.0
OTHER	32	91	7.7	28.6	7.7	18.7	33.0	4.4	5.5	29.7	12.1	16.5	26.4	9.9
FY 1971 PHD'S	95	411	11.7	13.7	10.0	24.0	34.0	6.6	17.6	19.6	6.8	26.4	24.2	5.4
FY 1972 PHD'S	92	381	15.4	15.9	6.6	26.8	30.8	4.5	19.3	21.1	9.6	26.2	17.6	6.1
FY 1973 PHD'S	121	538	9.5	18.0	3.7	30.3	30.9	7.6	9.5	19.9	9.1	31.6	21.2	8.7
FY 1974 PHD'S	143	599	10.7	15.7	8.7	29.5	32.0	3.4	14.9	22.1	10.6	24.1	25.1	3.2
FY 1975 PHD'S	219	569	13.6	9.5	5.8	39.9	24.7	6.4	12.9	14.1	7.8	42.2	16.9	6.2
NIH/ADAMHA/HRA PREDOCS	210	581	51.7	5.9	5.4	23.1	8.0	5.9	61.7	5.9	6.6	15.7	6.2	4.0
OTHER BEHAVIORAL PHD'S	460	1917		17.1	7.3	33.0	36.9	5.6		23.3	9.5	35.0	25.7	6.5
MALE	499	1930	10.0	15.3	7.4	33.0	28.2	6.1	13.2	20.0	9.4	31.2	19.5	6.8
FEMALE	171	568	18.6	12.0	5.1	23.0	37.1	4.2	18.3	16.5	7.1	28.4	26.8	2.8

SOURCE: NRC, Survey of Biomedical and Behavioral Scientists, Washington, D.C., 1976.

APP. G12.3 PRIMARY SOURCES OF SUPPORT IN THIRD AND FOURTH YEARS OF GRADUATE SCHOOL--ACADEMIC

	ALL PHD'S		PERCENT SUPPORTED IN THIRD YEAR BY						PERCENT SUPPORTED IN FOURTH YEAR BY					
			--TRG/FELL--		FEDL	UNIV			--TRG/FELL--		FEDL	UNIV		
PHD FIELD/YEAR/SUPPORT/SEX	SURVEY RESP	EST TOTAL	NIH/ ADAMHA	OTHER FEDL	RES GRANT	OR STATE	PER SONAL	OTHER/ UNKN	NIH/ ADAMHA	OTHER FEDL	RES GRANT	OR STATE	PER SONAL	OTHER/ UNKN
TOTAL BEHAVIORAL SCIENCES	2240	8130	20.1	21.1	7.3	32.4	12.9	6.4	21.3	16.1	7.8	29.9	17.3	7.5
ANTHROPOLOGY	286	1087	19.5	23.3	4.5	33.6	12.0	7.0	26.5	14.4	5.5	25.1	17.3	11.3
BIOLOGICAL & MEDICAL	47	175	23.3	6.4	1.7	47.7	9.3	11.6	22.9	7.8	7.2	31.9	21.7	8.4
CULTURAL & SOCIAL	214	813	20.5	25.4	5.7	29.4	12.6	6.4	29.6	14.9	5.8	21.5	16.1	12.1
OTHER	25	99	5.1	35.4		43.4	12.1	4.0	8.1	21.2		41.4	19.2	10.1
PSYCHOLOGY	1443	4690	21.4	21.0	8.5	29.8	13.9	5.3	22.5	14.9	9.1	28.4	18.7	6.4
COGNITIVE	80	298	28.7	32.8	8.8	17.9	6.8	5.1	26.1	25.0	8.9	22.1	12.5	5.4
HUMAN DEVEL & GERONTOL	304	895	20.6	20.1	6.9	27.2	19.0	6.1	20.5	13.3	9.5	23.9	25.2	7.6
HUMAN LEARNING & PERFORM	95	364	20.4	17.9	11.2	25.1	20.4	5.0	20.7	14.7	5.6	27.9	25.7	5.3
NEUROBEHAVIORAL SCIENCES	84	207	34.8	22.2	14.0	19.3	6.8	2.9	38.3	21.4	11.4	15.4	10.4	3.0
PERCEPTUAL & SENSORY	56	213	22.0	29.7	14.4	19.1	9.6	5.3	27.2	23.3	15.3	18.8	9.9	5.4
PERSONALITY & EXPERMNTL	34	163	11.0	10.4	16.6	30.1	16.0	16.0	11.9	2.2	10.4	30.4	31.9	13.3
PHYSIOL & COMPARATIVE	184	448	31.7	15.9	8.8	35.6	4.8	3.2	29.8	8.0	7.6	41.8	9.9	2.8
PSYCHOLINGUISTICS	33	134	30.8	18.3	11.5	16.3	10.6	12.5	44.7	7.4	16.0	8.5	12.8	10.6
PSYCHOPHYSICS & -METRICS	49	124	7.3	22.6	15.3	41.1	7.3	6.5	10.8	21.6	18.0	30.6	8.1	10.8
SOCIAL	301	1034	20.9	23.1	5.6	32.1	12.4	5.8	22.0	15.0	6.7	28.2	19.1	8.9
OTHER	223	840	14.9	19.0	6.4	38.1	18.9	2.7	15.5	15.1	9.6	36.0	20.6	3.2
SOCIOLOGY	273	1643	18.9	16.5	5.9	38.3	10.4	10.1	18.1	17.0	5.8	36.1	14.1	9.0
COMPLEX ORGANIZ & PROF	47	316	18.3	8.3	7.1	34.0	15.1	17.3	11.9	11.6	9.3	29.5	16.8	20.9
CRIMINOLOGY&DEVIANT BEH	42	222	13.4	17.5	8.8	37.8	22.6		11.1	19.2	6.6	36.4	21.2	5.6
DEMOGRAPHY	25	118	28.8	14.4		18.6	4.2	33.9	32.2	11.0		22.0	4.2	30.5
MEDICAL	49	218	36.7	23.7	7.9	19.5	7.0	5.1	47.4	17.0	6.4	12.9	11.7	4.7
OTHER	110	769	14.1	17.8	4.9	48.6	6.9	7.7	13.0	19.4	5.2	46.3	13.2	2.9
OTHER BEHAVIORAL SCIENCES	238	713	14.5	28.6	6.7	33.6	12.9	3.7	13.4	24.4	7.3	33.7	15.4	5.8
COMMUNICATIONS SCIENCES	105	309	13.2	31.8	8.3	27.2	14.9	4.6	13.9	27.3	10.5	22.5	19.1	6.7
ETHOLOGY & SOCIOBIOLOGY	35	121	11.6	28.1	4.1	47.9	2.5	5.8	10.7	17.4	9.9	53.7	2.5	5.8
OTHER	98	280	17.2	25.2	6.2	34.3	15.3	1.8	14.1	24.7	2.7	36.1	17.6	4.7
FY 1971 PHD'S	379	1570	22.5	22.7	9.2	29.6	9.7	6.3	24.3	20.3	11.8	22.0	12.7	8.9
FY 1972 PHD'S	375	1605	20.2	24.8	7.8	26.8	15.5	4.9	25.1	17.7	6.7	24.6	20.0	5.9
FY 1973 PHD'S	382	1456	20.8	21.6	6.1	32.8	11.9	6.8	23.5	17.1	5.9	30.6	16.0	6.9
FY 1974 PHD'S	426	1708	19.6	18.7	5.8	37.1	12.4	6.4	15.8	13.5	6.5	37.3	19.5	7.5
FY 1975 PHD'S	678	1791	17.8	18.2	7.4	34.8	14.4	7.4	19.1	12.9	8.1	33.7	18.0	8.2
NIH/ADAMHA/HRA PREDOCS	892	2402	67.4	9.6	2.6	15.6	2.5	2.3	70.6	6.1	2.6	12.7	5.0	3.0
OTHER BEHAVIORAL PHD'S	1348	5728		25.9	9.3	39.4	17.2	8.1		20.4	10.1	37.4	22.6	9.5
MALE	1531	5680	18.5	21.9	8.4	32.5	12.8	5.9	19.7	16.9	8.7	32.3	15.9	6.4
FEMALE	709	2450	23.6	19.3	4.6	32.1	12.9	7.4	25.2	14.2	5.7	24.3	20.6	10.1

SOURCE: NRC, Survey of Biomedical and Behavioral Scientists, Washington, D.C., 1976.

APP. G12.2 PRIMARY SOURCES OF SUPPORT IN THIRD AND FOURTH YEARS OF GRADUATE SCHOOL--NONACADEMIC

	ALL PHD'S		PERCENT SUPPORTED IN THIRD YEAR BY						PERCENT SUPPORTED IN FOURTH YEAR BY					
			--TRG/FELL--		FEDL	UNIV			--TRG/FELL--		FEDL	UNIV		
PHD FIELD/YEAR/SUPPORT/SEX	SURVEY RESP	EST TOTAL	NIH/ ADAMHA	OTHER FEDL	RES GRANT	OR STATE	PER SONAL	OTHER/ UNKN	NIH/ ADAMHA	OTHER FEDL	RES GRANT	OR STATE	PER SONAL	OTHER/ UNKN
TOTAL BEHAVIORAL SCIENCES	671	2498	14.8	18.9	8.1	29.8	21.4	7.0	14.6	14.9	10.7	27.5	23.7	8.7
ANTHROPOLOGY	42	168	19.1	9.3	2.5	35.8	27.2	6.2	17.3		9.6	39.1	22.4	11.5
BIOLOGICAL & MEDICAL	3	13	46.2			53.8					46.2	53.8		
CULTURAL & SOCIAL	29	108	24.0	11.5		24.0	30.8	9.6	26.0		9.4	22.9	29.2	12.5
OTHER	10	47		6.7	8.9	57.8	26.7		4.3			68.1	14.9	12.8
PSYCHOLOGY	477	1652	14.0	20.2	9.0	29.2	19.6	8.0	14.5	14.4	11.5	26.0	24.7	9.0
COGNITIVE	32	124	5.6	21.8	14.5	22.6	21.0	14.5	11.1	12.0	23.9	22.2	21.4	9.4
HUMAN DEVEL & GERONTOL	89	270	19.3	13.0	3.7	33.3	21.9	8.9	16.1	5.0	3.3	24.8	38.8	12.0
HUMAN LEARNING & PERFORM	37	157	7.6	28.0	10.8	33.1	16.6	3.8	6.2	15.1	11.6	40.4	18.5	8.2
NEUROBEHAVIORAL SCIENCES	22	87	37.9	29.9	5.7	12.6		13.8	37.9	29.9	5.7	10.3	2.3	13.8
PERCEPTUAL & SENSORY	11	33	9.1	48.5		24.2	18.2		10.0	23.3	10.0	26.7	30.0	
PERSONALITY & EXPERMNTL	12	63	6.3	19.0	6.3	28.6	25.4	14.3		4.8	6.3	30.2	39.7	19.0
PHYSIOL & COMPARATIVE	51	138	21.7	23.2	16.7	23.2	4.3	10.9	20.3	26.6	14.1	25.8	7.8	5.5
PSYCHOLINGUISTICS	5	12	25.0			75.0			41.7			50.0		8.3
PSYCHOPHYSICS & -METRICS	29	50	16.0	16.0	8.0	24.0	34.0	2.0	18.8	6.3	6.3	22.9	43.8	2.1
SOCIAL	106	354	14.5	25.6	7.4	26.4	21.6	4.5	14.2	18.2	14.2	23.7	23.4	6.5
OTHER	83	364	7.8	11.6	11.6	35.5	24.9	8.6	11.5	12.1	13.3	26.9	26.9	9.4
SOCIOLOGY	83	451	17.1	11.5	3.8	33.7	28.4	5.5	17.1	18.1	5.9	31.6	20.2	7.1
COMPLEX ORGANIZ & PROF	22	152	10.5	17.1	7.2	42.1	23.0		4.8	15.9	12.4	45.5	21.4	
CRIMINOLOGY&DEVIANT BEH	8	23	30.4	17.4		39.1	13.0		21.7	17.4		39.1	21.7	
DEMOGRAPHY	14	72	8.3	2.8		47.2	15.3	26.4	29.2	2.8	6.9	36.1	5.6	19.4
MEDICAL	13	49	42.9			8.2	49.0		44.2			9.3	46.5	
OTHER	23	155	17.4	12.9	3.9	26.5	35.5	3.9	14.5	34.1	1.4	20.3	18.1	11.6
OTHER BEHAVIORAL SCIENCES	72	227	12.8	30.8	14.1	22.0	17.2	3.1	7.9	23.3	15.3	21.8	23.8	7.9
COMMUNICATIONS SCIENCES	32	99	13.1	37.4	5.1	24.2	20.2		2.5	32.9	3.8	26.6	29.1	5.1
ETHOLOGY & SOCIOBIOLOGY	8	37	21.6	10.8	40.5	27.0			22.9		62.9	14.3		
OTHER	32	91	8.8	31.9	13.2	17.6	20.9	7.7	6.8	23.9	6.8	20.5	28.4	13.6
FY 1971 PHD'S	95	411	20.0	24.0	3.4	24.9	18.8	8.8	22.3	16.1	3.2	22.8	23.4	12.1
FY 1972 PHD'S	91	381	17.6	16.0	9.1	29.4	21.1	6.7	19.2	17.8	9.3	26.2	19.2	8.2
FY 1973 PHD'S	121	538	9.9	19.3	8.7	32.0	18.6	11.5	7.7	18.4	11.9	28.5	22.2	11.3
FY 1974 PHD'S	144	599	13.0	21.7	9.8	24.5	28.0	2.8	12.0	12.1	16.8	23.0	28.9	7.1
FY 1975 PHD'S	220	569	15.7	13.6	8.5	37.0	19.2	6.0	15.2	11.7	9.3	35.3	22.5	5.9
NIH/ADAMHA/HRA PREDOCS	212	581	63.6	9.7	3.3	14.2	5.4	4.0	60.5	5.2	8.3	10.5	9.7	5.8
OTHER BEHAVIORAL PHD'S	459	1917		21.6	9.6	34.5	26.3	7.9		17.9	11.5	32.9	28.1	9.6
MALE	501	1930	13.5	19.7	8.5	30.9	19.5	7.9	13.5	14.6	12.5	29.3	21.2	8.9
FEMALE	170	568	19.2	16.0	6.9	25.9	28.1	3.9	18.1	15.8	4.8	21.3	32.1	8.0

SOURCE: NRC, Survey of Biomedical and Behavioral Scientists, Washington, D.C., 1976.

APP. 613.1 DEPENDENCE ON FEDERAL SUPPORT TO COMPLETE PH.D. PROGRAM--ACADEMIC

PHD FIELD/YEAR/SUPPORT/SEX	RECEIVED SOME FEDL SUPPORT SURVEY RESP	RECEIVED SOME FEDL SUPPORT EST TOTAL	PERCENT WHO WITHOUT SUPPORT FELT THEY COULD EARN PHD	PERCENT WHO WITHOUT SUPPORT FELT THEY COULD NOT EARN PHD	PERCENT WHO WITHOUT SUPPORT FELT THEY COULD UNCERTAIN
TOTAL BEHAVIORAL SCIENCES	1709	5495	17.8	54.8	27.4
ANTHROPOLOGY	219	758	20.2	54.4	25.5
BIOLOGICAL & MEDICAL	31	95	23.2	40.0	36.8
CULTURAL & SOCIAL	170	594	18.7	59.9	21.4
OTHER	18	69	29.0	26.1	44.9
PSYCHOLOGY	1114	3278	16.5	54.0	29.5
COGNITIVE	62	221	11.8	58.4	29.9
HUMAN DEVEL & GERONTOL	233	602	15.6	59.6	24.8
HUMAN LEARNING & PERFORM	74	261	20.7	64.8	14.6
NEUROBEHAVIORAL SCIENCES	75	181	12.2	55.8	32.0
PERCEPTUAL & SENSORY	46	162	15.4	51.2	33.3
PERSONALITY & EXPERMNTL	23	82	22.0	57.3	20.7
PHYSIOL & COMPARATIVE	147	343	14.0	50.7	35.3
PSYCHOLINGUISTICS	25	75	12.0	69.3	18.7
PSYCHOPHYSICS & -METRICS	36	92	25.0	55.4	19.6
SOCIAL	234	706	15.2	47.0	37.8
OTHER	159	553	20.8	49.2	30.0
SOCIOLOGY	196	969	19.1	57.1	23.8
COMPLEX ORGANIZ & PROF	30	163	19.0	57.1	23.9
CRIMINOLOGY&DEVIANT BEH	30	141	24.8	41.8	33.3
DEMOGRAPHY	17	65	29.2	63.1	7.7
MEDICAL	46	189	12.2	68.3	19.6
OTHER	73	411	18.7	56.2	25.1
OTHER BEHAVIORAL SCIENCES	180	490	20.2	56.3	23.5
COMMUNICATIONS SCIENCES	76	204	11.3	63.2	25.5
ETHOLOGY & SOCIOBIOLOGY	28	86	47.7	34.9	17.4
OTHER	76	200	17.5	58.5	24.0
FY 1971 PHD'S	307	1119	16.9	55.4	27.7
FY 1972 PHD'S	287	1097	17.3	55.8	26.9
FY 1973 PHD'S	303	1005	19.3	54.4	26.3
FY 1974 PHD'S	315	1091	20.0	50.8	29.2
FY 1975 PHD'S	497	1183	15.8	57.2	27.0
NIH/ADAMHA/HRA PREDOCS	985	2372	13.0	60.7	26.3
OTHER BEHAVIORAL PHD'S	724	3123	21.4	50.3	28.3
MALE	1174	3875	19.4	52.6	28.0
FEMALE	535	1620	13.9	60.0	26.1

SOURCE: NRC, Survey of Biomedical and Behavioral Scientists, Washington, D.C., 1976.

APP. G13.2 DEPENDENCE ON FEDERAL SUPPORT TO COMPLETE PH.D. PROGRAM--NONACADEMIC

	RECEIVED SOME FEDL SUPPORT		PERCENT WHO WITHOUT SUPPORT FELT THEY COULD		
PHD FIELD/YEAR/SUPPORT/SEX	SURVEY RESP	EST TOTAL	EARN PHD	NOT EARN PHD	UNCERTAIN
TOTAL BEHAVIORAL SCIENCES	476	1615	28.3	43.3	28.4
ANTHROPOLOGY	26	87	34.5	32.2	33.3
BIOLOGICAL & MEDICAL	2	10		100.0	
CULTURAL & SOCIAL	22	72	38.9	20.8	40.3
OTHER	2	5	40.0	60.0	
PSYCHOLOGY	333	1064	27.0	44.7	28.3
COGNITIVE	22	80	8.8	47.5	43.8
HUMAN DEVEL & GERONTOL	56	163	19.6	44.8	35.6
HUMAN LEARNING & PERFORM	23	95	13.7	42.1	44.2
NEUROBEHAVIORAL SCIENCES	21	81	24.7	60.5	14.8
PERCEPTUAL & SENSORY	9	28	28.6	42.9	28.6
PERSONALITY & EXPERMNTL	9	36	44.4	36.1	19.4
PHYSIOL & COMPARATIVE	45	121	14.9	61.2	24.0
PSYCHOLINGUISTICS	3	6		50.0	50.0
PSYCHOPHYSICS & -METRICS	21	33	18.2	57.6	24.2
SOCIAL	80	239	26.4	39.7	33.9
OTHER	44	182	57.1	33.0	9.9
SOCIOLOGY	61	287	35.5	36.2	28.2
COMPLEX ORGANIZ & PROF	13	75	40.0	29.3	30.7
CRIMINOLOGY&DEVIANT BEH	7	18	61.1	33.3	5.6
DEMOGRAPHY	13	62	40.3	51.6	8.1
MEDICAL	11	43	20.9	51.2	27.9
OTHER	17	89	30.3	24.7	44.9
OTHER BEHAVIORAL SCIENCES	56	177	21.5	51.4	27.1
COMMUNICATIONS SCIENCES	27	86	7.0	57.0	36.0
ETHOLOGY & SOCIOBIOLOGY	8	37	43.2	48.6	8.1
OTHER	21	54	29.6	44.4	25.9
FY 1971 PHD'S	72	291	28.9	44.7	26.5
FY 1972 PHD'S	73	262	24.0	44.7	31.3
FY 1973 PHD'S	84	333	29.1	42.3	28.5
FY 1974 PHD'S	106	407	33.7	41.0	25.3
FY 1975 PHD'S	141	322	23.6	44.7	31.7
NIH/ADAMHA/HRA PREDOCS	209	573	21.3	51.0	27.7
OTHER BEHAVIORAL PHD'S	267	1042	32.1	39.1	28.8
MALE	355	1257	28.6	42.0	29.4
FEMALE	121	358	27.1	47.8	25.1

SOURCE: NRC, Survey of Biomedical and Behavioral Scientists, Washington, D.C., 1976.

APP. G14.1 INFLUENCE OF THE AVAILABILITY OF FINANCIAL ASSISTANCE ON THE SELECTION OF A PH.D. FIELD--ACADEMIC

PHD FIELD/YEAR/SUPPORT/SEX	ALL PHD'S SURVEY RESP	 EST TOTAL	PERCENT INDICATING AVAILABILITY HAD SOME EFFECT	 NO EFFCT	 UNCER TAIN
TOTAL BEHAVIORAL SCIENCES	2211	8130	24.8	68.5	6.7
ANTHROPOLOGY	285	1087	16.2	78.6	5.2
BIOLOGICAL & MEDICAL	47	175	27.3	70.3	2.3
CULTURAL & SOCIAL	213	813	14.0	79.5	6.5
OTHER	25	99	14.1	85.9	
PSYCHOLOGY	1419	4690	25.3	67.3	7.4
COGNITIVE	79	298	25.3	65.9	8.9
HUMAN DEVEL & GERONTOL	299	995	28.4	65.6	6.0
HUMAN LEARNING & PERFORM	92	364	26.5	67.9	5.6
NEUROBEHAVIORAL SCIENCES	84	207	21.7	74.9	3.4
PERCEPTUAL & SENSORY	56	213	32.2	67.8	
PERSONALITY & EXPERMNTL	33	163	30.6	69.4	
PHYSIOL & COMPARATIVE	182	448	27.5	64.2	8.3
PSYCHOLINGUISTICS	31	104	6.1	71.4	22.4
PSYCHOPHYSICS & -METRICS	49	124	34.7	58.9	6.5
SOCIAL	297	1034	21.4	69.1	9.5
OTHER	217	840	24.3	67.3	8.5
SOCIOLOGY	279	1643	25.7	68.1	6.2
COMPLEX ORGANIZ & PROF	47	316	15.0	71.9	13.1
CRIMINOLOGY&DEVIANT BEH	40	222	9.6	88.0	2.4
DEMOGRAPHY	25	118	44.1	48.3	7.6
MEDICAL	49	218	45.4	53.2	1.4
OTHER	109	769	26.0	68.4	5.6
OTHER BEHAVIORAL SCIENCES	237	710	33.5	61.0	5.5
COMMUNICATIONS SCIENCES	105	309	37.9	55.1	7.0
ETHOLOGY & SOCIOBIOLOGY	35	121	18.2	75.2	6.6
OTHER	97	280	35.4	61.3	3.3
FY 1971 PHD'S	373	1570	24.4	67.9	7.7
FY 1972 PHD'S	369	1605	23.6	71.3	5.1
FY 1973 PHD'S	380	1456	26.3	68.7	5.1
FY 1974 PHD'S	423	1708	24.2	67.0	8.8
FY 1975 PHD'S	666	1791	26.0	67.7	6.4
NIH/ADAMHA/HRA PREDOCS	895	2402	29.1	62.7	8.2
OTHER BEHAVIORAL PHD'S	1316	5728	23.0	71.0	6.0
MALE	1515	5680	26.2	67.8	6.0
FEMALE	696	2450	21.6	70.1	8.3

SOURCE: NRC, Survey of Biomedical and Behavioral Scientists, Washington, D.C., 1976.

APP. G14.2 INFLUENCE OF THE AVAILABILITY OF FINANCIAL ASSISTANCE ON THE SELECTION OF A PH.D. FIELD--NONACADEMIC

	ALL PHD'S		PERCENT INDICATING AVAILABILITY HAD		
PHD FIELD/YEAR/SUPPORT/SEX	SURVEY RESP	EST TOTAL	SOME EFFECT	NO EFFCT	UNCER TAIN
TOTAL BEHAVICRAL SCIENCES	654	2498	20.9	74.2	4.9
ANTHROPOLOGY	42	168	12.0	88.0	
BIOLOGICAL & MEDICAL	3	13	46.2	53.8	
CULTURAL & SOCIAL	29	108	12.5	87.5	
OTHER	10	47		100.0	
PSYCHOLOGY	464	1652	23.9	70.8	5.3
COGNITIVE	31	124	27.1	68.6	4.2
HUMAN DEVEL & GERONTOL	84	270	30.8	64.0	5.1
HUMAN LEARNING & PERFORM	36	157	19.1	71.7	9.2
NEUROBEHAVIORAL SCIENCES	22	87	42.5	44.8	12.6
PERCEPTUAL & SENSORY	11	33	6.1	84.8	9.1
PERSONALITY & EXPERMNTL	11	63	15.1	84.9	
PHYSIOL & COMPARATIVE	51	138	25.4	65.9	8.7
PSYCHOLINGUISTICS	5	12	50.0	50.0	
PSYCHOPHYSICS & -METRICS	28	50	27.1	72.9	
SOCIAL	104	354	19.0	76.0	5.0
OTHER	81	364	21.0	76.2	2.8
SOCIOLOGY	77	451	15.1	79.5	5.4
COMPLEX ORGANIZ & PROF	22	152	2.6	84.2	13.2
CRIMINOLOGY&DEVIANT BEH	7	23	33.3	66.7	
DEMOGRAPHY	14	72	16.7	79.2	4.2
MEDICAL	13	49	53.1	46.9	
OTHER	21	155	12.0	88.0	
OTHER BEHAVIORAL SCIENCES	71	227	17.1	78.8	4.1
COMMUNICATIONS SCIENCES	32	99	15.2	82.8	2.0
ETHOLOGY & SOCIOBIOLOGY	8	37	16.2	83.8	
OTHER	31	91	19.8	72.1	8.1
FY 1971 PHD'S	94	411	12.5	84.8	2.7
FY 1972 PHD'S	92	381	21.8	71.4	6.9
FY 1973 PHD'S	118	538	24.1	70.6	5.3
FY 1974 PHD'S	136	599	18.0	79.8	2.2
FY 1975 PHD'S	214	569	26.4	66.2	7.4
NIH/ADAMHA/HRA PREDOCS	213	581	28.6	65.4	6.0
OTHER BEHAVIORAL PHD'S	441	1917	18.4	77.0	4.5
MALE	487	1930	21.3	74.3	4.4
FEMALE	167	568	19.5	74.1	6.4

SOURCE: NRC, Survey of Biomedical and Behavioral Scientists, Washington, D.C., 1976.

APPENDIX H

ESTIMATING CLINICAL RESEARCH EXPENDITURES

APPENDIX H

ESTIMATING CLINICAL RESEARCH EXPENDITURES

An estimate of the amount of support for clinical R and D in U.S. medical schools is needed in order to refine our model of demand for clinical faculty. The source of most of the medical school data we have been using is the annual edition of JAMA devoted to medical education, but this source does not contain the required estimate. The best data we can obtain from JAMA is total R and D expenditures in medical schools. This is the variable used in demand models in the 1977 report.

The approach taken to derive an estimate of clinical R and D expenditures in medical schools is to apply a correction factor to total R and D expenditures. A correction factor which seems appropriate is the proportion of total NIH obligations that goes to support clinical research. From 1969 to 1975, this proportion has increased by 56 percent as shown below. This growth rate is much greater than that shown by total NIH research obligations.

Clinical Research as Percent of NIH Obligations (NIH, 1975)

1965	1970	1971	1972	1973	1974	1975
25%	38%	30%	32%	34%	34%	39%

In the absence of any direct measurements, the above percentages offer the best available means of estimating clinical R and D expenditures in medical schools. Accordingly, they have been used to produce the data shown in Figure 4.2 and Table 4.1 (Volume 1).

There is of course a serious problem of defining clinical research which clouds any attempt to measure its support. The NIH estimates were derived generally from its Central Scientific Classification System (CSCS) in which each research grant is classified according to its primary field or discipline. If that discipline falls within a group identified as clinical science, then the grant is tabulated as such. All program project and center grants are identified as clinical by the NIH

The classification of any grant is admittedly subjective. Therefore estimates derived by this process are subject to considerable uncertainty. Other classification schemes in use at NIH would be likely to produce different estimates of clinical research from those derived from the CSCS system. But the latter have one advantage--they were produced for a series of years under a constant definition. Thus while the absolute levels may not be very precise, the change from year to year seems to have somewhat more validity.

APPENDIX I

SURVEYS OF NURSE PROGRAMS

APP. I 1.1 Master Degree Program Enrollments Since October 1974 in Selected Schools of Nursing with Doctoral or Pending Doctoral Programs

Institution	Academic Year 1974-75	1975-76	1976-77	1977-78	(est.) 1978-79	(est.) 1982-83
TOTAL	2,259	2,672	2,860	3,029	3,427	3,885
Doctoral site						
A	555	748	698	636	700	900
B	98	103	178	209	230	260
C		53	59	86	154	185
D	70	59	142	95	115	150
E	210	288	293	316	325	442
F	80	103	104	110	107	107
G	201	189	191	208	213	215
H	89	96	120	127	132	155
I	164	167	172	203	305	212
J	74	80	103	133	183	200
Pending doc. site						
K	231	269	251	283	300	300
L	77	81	79	91	108	158
M	147	147	154	172	170	170
N	201	201	212	236	250	296
O	62	88	104	124	135	135

SOURCE: NRC, Surveys of Doctoral and Pending Doctoral Programs for Nurses, Washington, D.C., 1978.

APP. I 1.2 Master Degree Enrollments Since October 1974 in Selected Schools of Nursing with Doctoral or Pending Doctoral Progams by Region of the Country

Region	Academic Year 1974-75	1975-76	1976-77	1977-78	(est.) 1978-79	(est.) 1982-83
TOTAL	2,259	2,672	2,860	3,029	3,427	3,885
Northeast						
1	555	748	698	636	700	900
2	201	201	212	236	250	296
3	62	88	104	124	135	135
Midwest						
1	201	189	191	208	213	215
2	89	96	120	127	132	155
3	164	167	172	203	305	212
4	74	80	103	133	183	200
South						
1	98	103	178	209	230	260
2	70	59	142	95	115	150
West						
1		53	59	86	154	185
2	210	288	293	316	325	442
3	80	103	104	110	107	107
4	231	269	251	283	300	300
5	77	81	79	91	108	158
6	147	147	154	172	170	170

SOURCE: NRC, Surveys of Doctoral and Pending Doctoral Programs for Nurses, Washington, D.C., 1978.

APP. I 2 Doctoral Degree Program Enrollments Since October 1974 in Selected Schools of Nursing

Institution	Academic Year 1974-75	1975-76	1976-77	1977-78	(est.) 1978-79	(est.) 1982-83
TOTAL	174	263	298	399	469	586
Doctoral Site						
A	129	185	176	200	200	200
B		5	9	31	42	47
C				5	24	44
D	16	23	34	49	55	75
E	27	29	29	32	39	60
F			3	7	13	15
G		9	19	28	29	32
H	2	4	9	14	19	33
I		6	8	16	26	35
J		2	11	17	22	45

SOURCE: NRC, Survey of Doctoral Programs for Nurses, Washington, D.C., 1978.

APP. I 3 Number of Doctoral Students Receiving Stipend Support in Selected Schools of Nursing by Type of Support, 1974-75 and 1977-78

	Type of Support (number receiving support)							
	Institutional Traineeship		Individual Fellowship		Research Assistantship		Other Institutional Awards	
Institution	1974-75	1977-78	1974-75	1977-78	1974-75	1977-78	1974-75	1978-78
TOTAL	43	107	5	32	13	19	32	70
Doctoral site								
A	2	1	0	0	1	4	15	18
B	0	15	0	0	0	1	0	5
C	0	0	0	3	0	0	0	0
D	0	14	0	0	0	4	0	14
E	24	19	5	11	12	7	12	10
F	15	9	0	0	0	2	1	2
G	0	14	0	9	0	1	0	11
H	2	3	0	7	0	0	0	2
I	0	16	0	2	0	0	0	0
J	0	16	0	0	0	0	4	8

SOURCE: NRC, Survey of Doctoral Programs for Nurses, Washington, D.C., 1978.

APP. I 4.1 Number of Faculty Engaged in at Least One Research Project in Selected Schools of Nursing with Doctoral or Pending Doctoral Programs in October 1977

	Number Engaged in Research						
Institution	0	1-10	11-20	21-30	31-40	41-50	51-60
Doctoral Site							
A		X					
B				X			
C					X		
D			X				
E							X
F		X					
G							X
H		X					
I			X				
J				X			
Pending Doc. Site							
K						X	
L			X				
M			X				
N		X					
O				X			

SOURCE: NRC, Surveys of Doctoral and Pending Doctoral Programs for Nurses, Washington, D.C., 1978.

APP. I 4.2 Number of Faculty Engaged in at Least One Research Project in Selected Schools of Nursing with Doctoral or Pending Doctoral Programs in October 1977 by Region of the Country

	Number Engaged in Research						
Region	0	1-10	11-20-	21-30	31-40	41-50	51-60
Northeast							
1		X					
2		X					
3				X			
Midwest							
1							X
2		X					
3			X				
4				X			
South							
1				X			
2			X				
West							
1					X		
2							X
3		X					
4						X	
5			X				
6			X				

SOURCE: NRC, Surveys of Doctoral and Pending Doctoral Programs for Nurses, Washington, D. C., 1978.

APP I 5 Number of Faculty Engaged in More Than One Research Project in Selected Schools of Nursing with Doctoral or Pending Doctoral Programs In October 1977

Institution	Number Engaged in More Than One Research Project						
	0	1-10	11-20	21-30	31-40	41-50	51-60
Doctoral site							
A		X					
B							
C			X				
D		X					
E		X					
F		X					
G			X				
H		X					
I	X						
J		X					
Pending doc. site							
K		X					
L		X					
M		X					
N	X						
O		X					

Source: NRC, Surveys of Doctoral and Pending Doctoral Programs for Nurses, Washington, D.C., 1978.

APP. I 6.1 Number of Research Grants/Contracts by Amount of Direct Cost Support in Selected Schools of Nursing with Doctoral or Pending Doctoral Programs in October 1977

Institution	Research Support (no. of projects in each category) Less than $20,000	$20,000 to 99,999	$100,000 to 199,999	More than $200,000
TOTAL	37	41	10	4
Doctoral Site				
A		4		
B	2			
C	2		4	
D (zero)				
E	1	2		2
F	4	1		
G	3	4	2	
H	3	8		
I	2	3		
J	4	9	1	1
Pending Doc. Site				
K	4	2	3	1
L	2	1		
M	2	4		
N (zero)				
O	8	3		

SOURCE: NRC Surveys of Doctoral and Pending Doctoral Programs for Nurses, Washington, D.C., 1978

APP. I 6.2 Number of Research Grants/Contracts by Amount of Direct Cost Support in Selected Schools of Nursing with Doctoral or Pending Doctoral Programs in October 1977 by Region of the Country

Region	Research Support (no. of projects in each category)			
	Less than $20,000	$20,000 to 99,999	$100,000 to 199,999	More than $200,000
	37	41	10	4
Northeast				
1		4		
2 (zero)				
3	8	3		
Midwest				
1	3	4	2	
2	3	8		
3	2	3		
4	4	9	1	1
South				
1	2			
2 (zero)				
West				
1	2		4	
2	1	2		2
3	4	1		
4	4	2	3	1
5	2	1		
6	2	4		

SOURCE: NRC, Surveys of Doctoral and Pending Doctoral Programs for Nurses, Washington, D.C., 1978.

APP. I 7.1 Amount of Research Development Support (Direct Costs) in Selected Schools of Nursing with Doctoral or Pending Doctoral Programs in October 1977

Institution	Research Development Support (no. of projects in each category)			
	Less than $20,000	$20,000 to 99,999	$100,000 199,999	More than $200,000
TOTAL	7	5	3	1
Doctoral site				
A			1	
B (zero)				
C (zero)				
D			1	
E	1			
F (zero)				
G			1	1
H	1			
I	2			
J		1		
Pending doc. site				
K	1	1		
L	1			
M		2		
N (zero)				
O	1	1		

SOURCE: NRC, Surveys of Doctoral and Pending Doctoral Programs for Nurses, Washington, D.C., 1978.

APP. I 7.2 Amount of Research Development Support (Direct Costs) in Selected Schools of Nursing with Doctoral or Pending Doctoral Programs in October 1977 by Region of the Country

	Research Development Support (no. of projects in each category)			
Region	Less than $20,000	$20,000 - 99,999	$100,000 199,999	More than $200,000
TOTAL	7	5	3	1
Northeast				
1			1	
2 (zero)				
3	1	1		
Midwest				
1			1	1
2	1			
3	2			
4		1		
South				
1 (zero)				
2			1	
West				
1 (zero)				
2	1			
3 (zero)				
4	1	1		
5	1			
6		2		

SOURCE: NRC, Surveys of Doctoral and Pending Doctoral Programs for Nurses, Washington, D.C., 1978.

APP. I 8.1 Single Greatest Need to Strengthen Research Capability in Selected Schools of Nursing with Doctoral or Pending Doctoral Programs

Institution	Need				
	Research Faculty	Institutional Funds	Space and Equipment	Research Funds	Other
Doctoral site					
A	X				
B		X			
C		X			
D	X				
E	X				
F		X		X	
G		X			
H					
I	X				
J				X	
Pending doc. site					
K					X
L					X
M	X				
N	X				
O	X				

SOURCE: NRC, Surveys of Doctoral and Pending Doctoral Programs for Nurses, Washington, D.C., 1978.

APP. I A.2 Single Greatest Need to Strengthen Research Capability in Selected Schools of Nursing with Doctoral or Pending Doctoral Programs by Region of the Country

Region	Need Research Faculty	Institutional Funds	Space and Equipment	Research Funds	Other
Northeast					
1	X				
2	X				
3	X				
Midwest					
1		X			
2		X			
3	X				
4				X	
South					
1		X			
2	X				
West					
1		X			
2	X				
3				X	
4					X
5					X
6	X				

SOURCE: NRC,Surveys of Doctoral and Pending Doctoral Programs for Nurses, Washington, D.C., 1978.

APPENDIX I 9

SURVEY OF DOCTORAL PROGRAMS FOR NURSES

Conducted by the National Research Council

THE ACCOMPANYING LETTER requests your assistance in this survey of doctoral programs for nurses.

PLEASE READ the instructions carefully and answer by printing your reply or entering an "X" in the appropriate box.

NOTE: ALL INFORMATION YOU PROVIDE WILL BE TREATED AS CONFIDENTIAL.

INSTITUTION: ______________________

ADDRESS: ______________________ INTERVIEWER: ________

______________________ DATE: ________

____

DEAN: ______________________

GRADUATE PROGRAM INFORMATION

Instructions: In the questions below, please type or clearly print all numerical answers in the space provided. For those questions which require longer descriptive replies, please append answers as appropriate.

(1) Please provide information regarding degree-program **ENROLLMENTS** or **POSTDOCTORAL APPOINTMENTS** for each academic year specified in the table below:

Degree Program	Enrollments/Postdoctoral Appointments per Academic Year					
	1974-75	1975-76	1976-77	1977-78	Est. 1978-79	Est. 1982-83
Master Degree: Fulltime						
Parttime						
TOTAL						
DOCTORAL DEGREE: Fulltime						
Parttime						
TOTAL						
Post-Doctoral Appts.						

(2) Please indicate below, the **PRIMARY REASON** in your opinion for any change (or absence of change) in academic enrollments or postdoctoral appointments between 1974-75 and 1977-78 as indicated in Question 1.

MASTER DEGREE ENROLLMENTS

Fulltime: ______________________

Parttime: ______________________

DOCTORAL DEGREE ENROLLMENTS

Fulltime: ______________________

Parttime: ______________________

POSTDOCTORAL APPOINTMENTS

Fulltime: ______________________

Parttime: ______________________

(3) What was the number of **APPLICATIONS** received from nurses for **DOCTORAL PROGRAM STUDY** for each of the following academic years:

ACADEMIC YEAR	FULLTIME	PARTTIME
1974-75	______	______
1977-78	______	______

(4) Please provide information regarding the number of **DEGREES AWARDED** or individuals **COMPLETING POSTDOCTORAL STUDIES** for each academic year specified in the table below:

Degree Program	Degrees Awarded/Postdoctoral Completions per Academic Year					
	1974-75	1975-76	1976-77	Est. 1977-78	Est. 1978-79	Est. 1982-83
Master Degree						
Doctoral Degree						
Post-Doctoral Appts.						

(5) Please indicate below, the **PRIMARY REASON** in your opinion for any change (or absence of change) i the number of degrees awarded or postdoctoral completions between 1974-75 and 1977-78 as indicat in Question 4 (above)

MASTER DEGREE: ______________________

DOCTORAL DEGREE: ______________________

POSTDOCTORALS: ______________________

(6) Using the categories provided below, please specify the **PRIMARY EMPLOYMENT SECTOR** for those individuals completing their degrees or postdoctoral appointments in 1977.

PRIMARY EMPLOYMENT SECTOR:

MASTER DEGREE AWARDEES (1976-77): ______________________

DOCTORAL DEGREE AWARDEES (1976-77): ______________________

POSTDOCTORALS (1976-77): ______________________

Employment Sectors

University:
- Medical School
- University-owned or -affiliated teaching hospital
- Other health professional school
- Other professional school
- Faculty of arts & sciences
- Other (specify)

Other Educational Institution:
- 4-year college
- 2-year college or technical school
- Other (specify)

Government:
- Federal
- State
- Local

Business:
- Self-employed
- Pharmaceutical firm
- Other business or industry

Other sectors:
- Hospital/clinic
- Non-profit organization
- Other (specify)

(7) a. Does your department make an ORGANIZED effort to provide APPLICANTS for doctoral study information concerning the current and/or projected state of the labor market in the field?

☐ YES ☐ NO

b. If YES, check all that apply:

☐ Provide national data about the labor market
☐ Provide information about positions recent graduates have taken
☐ Counsel individuals about career options
☐ Other, specify ______________________________

(8) a. Do you require Graduate Record Exam (GRE) test scores for admission?

☐ YES ☐ NO

b. If YES, using the combined verbal and quantitative GRE aptitude tests (e.g., 525 + 650 = 1175), what was the AVERAGE OF THE COMBINED test scores for those admitted to the first year of graduate training in your program for the Fall 1974 through the Fall 1977?

Fall, 1974 Average ________ Fall, 1976 Average ____________
Fall, 1975 Average ________ Fall, 1977 Average _________

SOURCES OF STUDENT SUPPORT: DOCTORAL EDUCATION/TRAINING

Instructions: Please provide answers to Questions 9 through 12 below for FULLTIME enrollments only.

(9) What was the total number of INSTITUTIONAL TRAINEESHIPS awarded for each academic year below for each source of support?

	Academic Year			Academic Year	
Support Agency	1974-75	1977-78	Support Agency	1974-75	1977-78
NIH	______	______	State	______	______
ADAMHA	______	______	Private	______	______
Nursing (HRA)	______	______		______	______
Other federal	______	______			

(10) What was the total number of INDIVIDUAL FELLOWSHIPS awarded for each academic year below for each source of support:

	Academic Year			Academic Year	
Support Agency	1974-75	1977-78	Support Agency	1974-75	1977-78
NIH	______	______	State	______	______
ADAMHA	______	______	Private	______	______
Div. of Nursing (HRA)	______	______	Other	______	______
Other federal	______	______			

(11) What was the total number of RESEARCH ASSISTANTSHIPS provided for support for each academic year below for each source of support:

	Academic Year			Academic Year	
Support Agency	1974-75	1977-78	Support Agency	1974-75	1977-78
NIH	______	______	State	______	______
ADAMHA	______	______	Private	______	______
Div. of Nursing (HRA)	______	______	Other	______	______
Other federal	______	______			

(12) What was the total number of OTHER INSTITUTIONAL AWARDS (including TEACHING ASSISTANTSHIPS, LECTURESHIPS, et al.) provided for support for each academic year below for each source of support:

	Academic Year			Academic Year	
Support Agency	1974-75	1977-78	Support Agency	1974-75	1977-78
NIH	______	______	State	______	______
ADAMHA	______	______	Private	______	______
Div. of Nursing (HRA)	______	______	Other	______	______
Other federal	______	______			

SOURCES OF STUDENT SUPPORT: POSTDOCTORAL TRAINING

Instructions: Please provide answers to questions 13 through 16 below for FULLTIME postdoctoral appointments only.

(13) What was the total number of INSTITUTIONAL TRAINEESHIPS awarded for each academic year below for each source of support?

	Academic Year			Academic Year	
Support Agency	1974-75	1977-78	Support Agency	1974-75	1977-78
NIH	______	______	State	______	______
ADAMHA	______	______	Private	______	______
Div. of Nursing (HRA)	______	______	Other	______	______
Other federal	______	______			

(14) What was the total number of INDIVIDUAL FELLOWSHIPS awarded for each academic year below for each source of support:

	Academic Year			Academic Year	
Support Agency	1974-75	1977-78	Support Agency	1974-75	1977-78
NIH	______	______	State	______	______
ADAMHA	______	______	Private	______	______
Nursing (HRA)	______	______	----	______	______
Other federal	______	______			

(15) What was the total number of RESEARCH ASSISTANTSHIPS provided for support for each academic year below for each source of support:

	Academic Year			Academic Year	
Support Agency	1974-75	1977-78	Support Agency	1974-75	1977-78
NIH	______	______	State	______	______
ADAMHA	______	______	Private	______	______
Div. of Nursing	______	______	Other	______	______
Other federal	______	______			

(16) What was the total number of OTHER INSTITUTIONAL AWARDS (including TEACHING ASSISTANTSHIPS, LECTURESHIPS, et al.) provided for support for each academic year below for each source of support:

	Academic Year			Academic Year	
Support Agency	1974-75	1977-78	Support Agency	1974-75	1977-78
NIH	______	______	State	______	______
ADAMHA	______	______	Private	______	______
Div. of Nursing	______	______	Other	______	______
Other federal	______	______			

FACULTY: SCHOOL OF NURSING

Instructions: In each of the questions below, please provide all answers for the period beginning on OCTOBER 1 for each year specified.

---

(17) How many individuals were employed as faculty members in the School of Nursing as of OCTOBER 1:

	1974	1975	1976	1977	Est. 1978	Est. 1982
TOTAL NO. FACULTY	____	____	____	____	____	____
Fulltime Equivalent (FTE) Faculty	____	____	____	____	____	____
TOTAL NO. FACULTY ASSIGNED TO DOCTORAL PROGRAM	____	____	____	____	____	____
FTE Doctoral Program Faculty	____	____	____	____	____	____
TOTAL NO. FACULTY ASSIGNED TO OTHER GRADUATE PROGRAM	____	____	____	____	____	____
FTE Other Graduate Program Faculty	____	____	____	____	____	____
TOTAL NO. FACULTY ASSIGNED TO UNDERGRADUATE PROGRAM	____	____	____	____	____	____
FTE Undergraduate Program Faculty	____	____	____	____	____	____

(18) Approximately what percent of the total work time for FACULTY ASSIGNED TO THE DOCTORAL PROGRAM was spent on average in each of the following activities as of OCTOBER 1, 1977?

Research/Development ________ %
Teaching ________ %
Administration/Management ________ %
Consulting ________ %
Professional Services
(including clinical practice) ________ %
Other, specify _____ ________ %

----
100 %

(19) a. If you plan to INCREASE the number of DOCTORAL PROGRAM FACULTY in 1982, indicate the number of faculty sought with credentials in each area indicated below:

☐ NOT APPLICABLE

Ph.D. in Nursing ______
Ph.D. in Science ______
Ed.D. ______
D.P.H. ______
D.N.S./D.N.Sc. ______
Other, specify ________ ______

b. What percent of the NEW FACULTY total work time would you LIKE TO SEE spent on average in each of the following activities as of OCTOBER 1, 1982?

Research/Development ________ %
Teaching ________ %
Administration/Management ________ %
Consulting ________ %
Professional Services
(including clinical practice) ________ %
Other, specify ____ ________ %

----
100 %

SURVEY OF PENDING DOCTORAL PROGRAMS FOR NURSES

Conducted by the National Research Council

THE ACCOMPANYING LETTER requests your assistance in this survey of doctoral programs for nurses. **PLEASE READ** the instructions carefully and answer by printing your reply or entering an "X" in the appropriate box.

NOTE: ALL INFORMATION YOU PROVIDE WILL BE TREATED AS CONFIDENTIAL.

INSTITUTION: ______________________ **INTERVIEWER:** ______________

ADDRESS: ______________________ **DATE:** ______________

____

____

DEAN: ______________________

GRADUATE PROGRAM INFORMATION

Instructions: In the questions below, please type or clearly print all numerical answers in the spaces provided. For those questions which require longer descriptive replies, please append answers as appropriate.

(1) Please provide information regarding degree-program ENROLLMENTS for each academic year specified in the table below:

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Degree Program	Enrollments per Academic Year					
	1974-75	1975-76	1976-77	1977-78	Est. 1978-79	Est. 1982-83
Master Degree: Fulltime						
Parttime						
TOTAL						

(2) Please indicate below, the PRIMARY REASON in your opinion for any change (or absence of change) in academic enrollments between 1974-75 and 1977-78 as indicated in Question 1.

MASTER DEGREE ENROLLMENTS

Fulltime: ______________________

Parttime: ______________________

(3) Please provide information regarding the number of DEGREES AWARDED for each academic year specified in the table below:

Degree Program	Degrees Awarded per Academic Year					
	1974-75	1975-76	1976-77	1977-78	Est. 1978-79	Est. 1982-83
Master Degree:						

(4) Please indicate below, the PRIMARY REASON in your opinion for any change (or absence of change) in the number of degrees awarded or postdoctoral completions between 1974-75 1977-78 as indicated in Question 3 (above).

MASTER DEGREE: ______________________

____

(5) Using the categories provided below, please specify the PRIMARY EMPLOYMENT SECTOR for those individuals completing their degrees in 1977.

PRIMARY EMPLOYMENT SECTOR

MASTER DEGREE AWARDEES (1976-77): ______________________

Employment Sectors

University:
Medical School
University-owned or -affiliated teaching hospital
Other health professional school
Other professional school
Faculty of arts and sciences
Other (specify)

Other Educational Institution:
4-year college
2-year college or technical school
Other (specify)

Government:
Federal
State
Local

Business:
Self-employed
Pharmaceutical firm
Other business or industry

Other Sectors:
Hospital/clinic
Non-profit organization
Other (specify)

(6)a. Are you planning to establish a program for DOCTORAL STUDIES within your school or division in the next five years?

YES ☐ NO ☐

b. If YES, when do you anticipate accepting students? 19___.

(7)a. Have you received any INQUIRIES from nurses regarding this proposed DOCTORAL PROGRAM?

YES ☐ NO ☐

b. If YES, describe the type of program sought by these applicants? ______________________

____

____

____

(8)a. Will your department make an ORGANIZED effort to provide APPLICANTS for DOCTORAL STUDY information concerning the current and/or projected state of the labor market in the field?

YES ☐ NO ☐

b. If YES, check all that apply:

☐ Provide national data about the labor market

☐ Provide information about positions recent graduates have taken

☐ Counsel individuals about career options

☐ Other, specify ______________________

(9)a. Will you require Graduate Record Exam (GRE) test scores for admission?

YES ☐ NO ☐

b. If YES, using the combined verbal and quantitative GRE aptitude tests (e.g., 525 + 650 = 1175), what will be the minimum AVERAGE OF THE COMBINED test scores accepted for admission to the first year of DOCTORAL training?

AVERAGE ______________

FACULTY: SCHOOL OF NURSING

Instructions: In each of the questions below, please provide all answers for the period beginning on OCTOBER 1 for each year specified:

) How many individuals were employed as faculty members in the School of Nursing as of OCTOBER 1:

	1974	1975	1976	1977	Est. 1978	Est. 1982
TOTAL NO. FACULTY	____	____	____	____	____	____
Fulltime Equivalent (FTE) Faculty	____	____	____	____	____	____
TOTAL NO. FACULTY ASSIGNED TO DOCTORAL PROGRAM					____	____
FTE Doctoral Program Faculty					____	____
TOTAL NO. FACULTY ASSIGNED TO OTHER GRADUATE PROGRAM	____	____	____	____	____	____
FTE Other Graduate Program Faculty	____	____	____	____	____	____
TOTAL NO. FACULTY ASSIGNED TO UNDERGRADUATE PROGRAM	____	____	____	____	____	____
FTE Undergraduate Program Faculty	____	____	____	____	____	____

(11) Approximately what percent of the total work time for FACULTY ASSIGNED TO THE DOCTORAL PROGRAM will be spent on average in each of the following activities as of OCTOBER 1, 1978?

Research/Development	________%
Teaching	________%
Administration/Management	________%
Consulting	________%
Professional Services (including clinical practive	________%
Other, specify ________	________%
	100 %

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(12)a. If you plan to INCREASE the number of DOCTORAL PROGRAM FACULTY by 1982, indicate the number of faculty sought with credentials in each area indicated below:

☐ NOT APPLICABLE

Ph.D. in Nursing	____	D.P.H.	____
Ph.D. in Science	____	D.N.S./N.D.Sc.	____
Ed.D.	____	Other, specify ________	____

b. What percent of the NEW FACULTY total work time would you LIKE TO SEE spent on average in each of the following activities as of OCTOBER 1, 1983?

Research/Development	______%
Teaching	______%
Administration/Management	______%
Consulting	______%
Professional Services (including clinical practice)	______%
Other, specify ________	______%
	100 %

(14) From your hiring experiences in recent years, how would you characterize the current supply of doctorally-trained personnel to fill ALL AVAILABLE FACULTY POSITIONS?

	Doctorally-trained NURSES		
	Practice Oriented	Research Oriented	Doctorally-trained NON-NURSES
1. Critical shortage	☐	☐	☐
2. Moderate shortage	☐	☐	☐
3. Adequate supply	☐	☐	☐
Moderate surplus	☐	☐	☐
5 Critical surplus	☐	☐	☐

RESEARCH: SCHOOL OF NURSING

Instructions: As in the previous section, answer all questions for the period beginning on OCTOBER 1 for each year specified.

(15) a. How would you characterize the amount of research conducted by faculty in your school as of OCTOBER 1, 1977 compared with the amount of research in OCTOBER, 1975?

- ☐ A dramatic increment in the amount of research
- ☐ A moderate increment
- ☐ No change
- ☐ A moderate decrement
- ☐ A dramatic decrement in the amount of research

(16) a. As of OCTOBER 1, 1977, how many total number of faculty in your school were engaged in AT LEAST ONE research project? ____________

b. How many were engaged in MORE THAN ONE research project? ____________

(17) As of OCTOBER 1, 1977, how much support for RESEARCH was available for academic year 1977-78 through research grants or contracts? (Exclude research development support)

	Amount of Support (Direct Costs)							
SOURCE OF SUPPORT	Less than $20,000	No. Proj.	$20,000 to $99,999	No. Proj.	$100,000 to $199,999	No. Proj.	More than $200,000	No. Proj.
NIH	☐	____	☐	____	☐	____	☐	____
ADAMHA	☐	____	☐	____	☐	____	☐	____
Div. of Nursing (HRA)	☐	____	☐	____	☐	____	☐	____
Other federal	☐	____	☐	____	☐	____	☐	____
State	☐	____	☐	____	☐	____	☐	____
Institutional	☐	____	☐	____	☐	____	☐	____
Private Foundation	☐	____	☐	____	☐	____	☐	____
Other, specify ________	☐	____	☐	____	☐	____	☐	____

(18) As of OCTOBER 1, 1977, what funds were available to support RESEARCH DEVELOPMENT in your school? (Exclude individual research grants and contracts reported in Question 18)

	Amount of Support (Direct Costs)			
SOURCE OF SUPPORT	Less than $20,000	$20,000 to $99,999	$100,000 to $199,999	More than $200,000
Federal Government, specify ____________	☐	☐	☐	☐
State Government, specify ____________	☐	☐	☐	☐
Institutional	☐	☐	☐	☐
Other	☐	☐	☐	☐

(19) From the list below, select the ONE factor which represents your greatest NEED at this time for strengthening the research capability of your institution. (Check only one)

- ☐ More well-prepared research faculty
- ☐ More institutional funds to support faculty/programs
- ☐ More space and equipment
- ☐ More research funds through grans and/or contracts
- ☐ Other, specify ____________________________

(YOUR HAVE COMPLETED THIS QUESTIONNAIRE. THANK YOU FOR YOUR PARTICIPATION IN THIS SURVEY.)

COMMENTS:

This report is made pursuant to Contract No. N01-OD-5-2109. The amount charged to the Department of Health, Education, and Welfare for the work resulting in this report (inclusive of the amount so charged for any prior report submitted under this contract) is $2,450,000. This amount covers the period from October 1975 through August 1978 and includes costs incurred in producing a report on the feasibility of this study, and annual reports for 1975, 1976, 1977, and 1978. The names of the persons employed or retained by the Contractor, with managerial or professional responsibility for such work, or for the content of the reports are given on pages x, and 161-166 of the report.

Support for this project came from Evaluation Set-Aside funds (Section 513 of the PHS Act), Evaluation Project No. NIH 75-1.